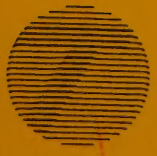
A MANUAL OF POLICIES AND PROCEDURES FOR OPERATION OF THE TRANSPORTATION RESEARCH AND DEVELOPMENT BUREAU



TRANSPORTATION RESEARCH AND DEVELOPMENT BUREAU
NEW YORK STATE DEPARTMENT OF TRANSPORTATION

A MANUAL OF POLICIES AND PROCEDURES FOR OPERATION OF THE TRANSPORTATION RESEARCH AND DEVELOPMENT BUREAU

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PREFACE

ISTEA -- the Intermodal Surface Transportation Efficiency Act of 1991 – led FHWA (the Federal Highway Administration) to institute rulemaking changes rendering each state both more autonomous and more accountable for its own research program. ISTEA also mandated that a minimum 25 percent of SPR funds (State Planning and Research) be spent on RD&T activities (research, development, and technology transfer).

Although the FHWA rulemaking is undoubtedly beneficial, empowering states to deal with their own issues, it does require that states certify that their research programs conform to a pre-approved management process. Section 420.207 of 23 CFR, final rulemaking effective July 22, 1994, further requires each state to develop, establish, and implement a management process identifying and implementing RD&T activities expected to address priority transportation issues, including the following six points:

1. An interactive process for identifying and ranking RD&T activities to be included in the work program.

2. Use of all FHWA planning-and-research funds set aside for RD&T activities (to the maximum extent possible) either internally or through participation in national, regional pooled-fund, or cooperatively funded studies.

3. Procedures for tracking program activities, schedules, accomplishments, and fiscal commitments.

4. Support and use of the TRIS database (Transportation Research Information Service) for program development, reporting ongoing RD&T activities, and input of final report information.

5. Procedures to determine effectiveness of the state's management process in implementing the RD&T program, to determine use of the state's RD&T outputs, and to facilitate periodic peer reviews of its RD&T program.

6. Procedures to document RD&T activities through preparation of final reports. As a minimum, this must include data collection, analyses performed, conclusions, and recommendations. The states must actively implement appropriate research findings and should document the benefits.

This Manual has been developed primarily to assure that effective research is provided by and for the Department. It is intended to familiarize the staff of the Transportation Research and Development Bureau (TR&DB) with policies and procedures governing research activities, and also to provide information on the several research programs available to Bureau clients. Finally, the Manual serves as the Department's guide in addressing the six points just listed, thus assuring continued FHWA certification of the Department's RD&T program.

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1. PURPOSE AND CONTEXT OF THIS MANUAL

Background

Research -- a principal mission of the first national highway program -- is the oldest continuous federal highway activity. The Federal Highway Act of 1921 authorized the first sustained fiscal support for highway research. Support for highway research was reaffirmed in the Federal-Aid Highway Act of 1962, which mandated that a minimum portion of federal-aid highway funds be set aside exclusively for planning and research purposes. More recently, ISTEA (the Intermodal Surface Transportation Efficiency Act of 1991) not only substantially increased this set-aside (now called "SPR" funds, for State Planning and Research), but further mandated that a minimum 25 percent be expended on RD&T activities.

New York's research presence has evolved over the years to match needs of the times. During the interstate-highway era, the state's research emphasis was on new construction. As the interstate system neared completion and an aging infrastructure became the Department's major concern, emphasis shifted to rehabilitation. Today's managers and engineers are interested in effective yet environmentally sensitive design and construction methods, with emphasis on reduced life-cycle costs, improved maintenance techniques and schedules, and better methods of inspecting, determining, and reporting the reliability of bridges. In addition, the Department is committed to providing an efficient, environmentally sound, statewide intermodal transportation system. This will further expand RD&T activities throughout the Department. NYSDOT must define and coordinate these activities in order to conduct an effective, efficient research program, to maintain its FHWA (Federal Highway Administration) program certification, and to ensure that it meets its obligations to expend a minimum of 25 percent of its SPR funds on research.

Purpose

This manual's primary purpose is to assure effectiveness of the research provided by and for the Department. It also provides guidance necessary to maintain FHWA certification of the Department's RD&T program. It does so primarily by identifying the Department's various research activities and procedures and defining the agency's relationships with outside research organizations. The manual also defines the processes necessary to evaluate program effectiveness.

To ensure that effectiveness, in terms of process and products, several key concepts are considered throughout the manual:

- Determining the usefulness and implementation potential of research,
- To the extent possible, eliminating unnecessary duplication of research,
- Ensuring that short-term research results are incorporated into long-term programs,
- Assessing research, in terms of project and program accomplishments,

- Improving research through coordination of diverse disciplines when required to address particular problems, and
- Periodically assessing the continuation potential of each research project, based on periodic review of its progress.

Overview of This Manual

The chapters of this manual describe the Department's interactive process, from program development through program evaluation (including technology transfer), for proper identification and ranking of researchable problems and conduct of the work.

Chapter 2 describes the various research programs available to the Department, giving information on the type of work each performs, how it is funded, how each program relates to the Department, and how each program evaluates NYSDOT-recommended research projects.

Chapter 3 describes the Department's formal process for developing its in-house and contract research programs, from problem solicitation to program approval. This includes descriptions of various NYSDOT committees established as part of a formal interactive process to ensure a comprehensive, responsive research program. NYSDOT's process for submitting and selecting potential projects to be conducted by others is also described.

Chapter 4 describes the management control system needed to monitor conduct of research, including program activities, schedules, funds, and accomplishments.

Chapter 5 describes program-evaluation strategies designed to ensure that the Department receives maximum benefit from its research activities, including analyzing accomplishments and benefits, measuring effectiveness of individual projects and the overall program, and arranging peer exchanges to assess the overall research-management process.

Chapter 6 describes technology-transfer techniques (including use of the TRIS database) needed to facilitate adoption of research recommendations. It also describes the Department's relation to outside technology-transfer programs, such as the LTAP (the Local Technology Assistance Program) and HITEC (the Highway Innovative Technology Evaluation Center).

Appendices contain information supplementing the manual's text, including procedures and guidelines, organization charts, forms, and schedules pertaining to the Department' research program. Also included are procedures and guidelines applicable to internal functioning of the Transportation R&D Bureau.

In summary, this should be considered a living document that will be reviewed and revised periodically to reflect NYSDOT's research and technical mission and direction. As such, it is open to comments and recommendations for continuous improvement.

2. AVAILABLE RESEARCH PROGRAMS

Transportation research is conducted nationally, regionally, locally, and occasionally internationally. Programs conducting research may be publicly or privately funded, or funded as joint public-private partnerships. The level at which a project is undertaken is primarily a factor of its relevance. Projects of national interest are normally undertaken at that level. Similarly, those of regional interest are often run cooperatively under pooled-fund arrangements, and those of local interest are normally funded and managed by an individual state. Project cost is also a factor, with the more expensive normally funded at national or international levels.

Regardless of the forum, criteria for project selection are the same:

1. Relevance: is the problem of concern to the funding constituency?
2. Urgency: does the project address an immediate research need?
3. Applicability: what is the probability that results will be implemented?
4. Duplication: are similar efforts underway, or satisfactory solutions already available?
5. Planning: what is the probability of completion within scope, within budget, and on schedule?

Research results from nearly all other transportation research programs are available to the Department. NYSDOT conducts and sponsors its own research, and is formally involved in selecting and conducting research by others -- most notably, NCHRP (the National Cooperative Highway Research Program) and pooled-fund projects. This chapter provides an overview of programs with which the Department has most interaction, and describes its official involvement (if any) in them. This involvement may be complex, and TR&D coordinates all these activities for the Department. TR&D also manages all NYSDOT-sponsored research and technology-transfer activities; the latter are discussed in Chapter 6.

Department-Sponsored Research

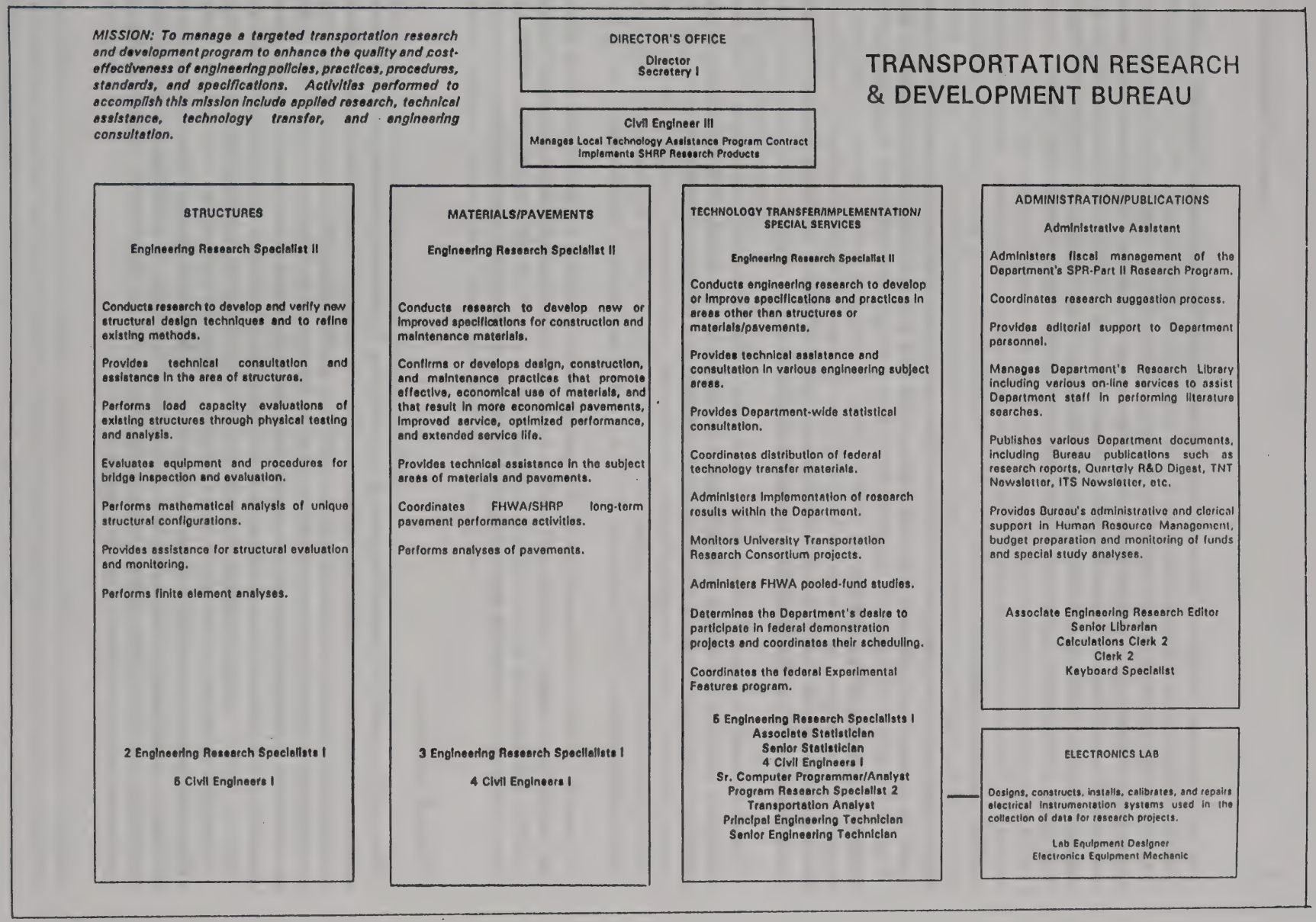
This includes research activities financed principally through funds appropriated in the Department's state budget, including applied and basic research, technology transfer, and technical consultation. All Department-sponsored projects are selected under the procedures described in Chapter 3. (The schedule for formally adding a project to the Department's program is outlined in Table 1.) Most Department-sponsored research is conducted primarily by in-house staff, which is consistent with TR&D's premise that both conduct of research and implementation of findings are facilitated by continuous interaction of the research staff with their Department clients. (TR&D's current organization chart is shown in Figure 1.)

When Department-sponsored research cannot be conducted in-house because of lack of expert staff or available time, projects may be conducted by a research consortium under contract to the Department. Comprised of a minimum of three universities, colleges, or other research institutions, this consortium has been designated under the laws, rules, and regulations governing selection of outside consultants. At this writing, the Transportation Infrastructure Research Consortium (TIRC) consists of Cornell University as administrator and lead institution, with the following

Table 1. Project/Program Schedules.

NYSDOT IN-HOUSE/CONTRACT RESEARCH (BIENNIAL in odd-numbered years)	
July	Research Executive Board (REB) determines research-emphasis areas
8/1-10/31	TR&D publicizes emphasis areas and solicits problem statements
8/1-12/31	TR&D and Technical Working Groups (TWGs) screen statements
January	R&D Council (RDC) ranks statements
February	REB approves program and sets budget
NOTE: All steps (except July development of research areas) are also conducted annually for UTRC projects	
NCHRP RESEARCH (ANNUAL)	
8/1-10/31	TR&D publicizes emphasis areas and solicits problem statements
8/1-12-31	TR&D and TWGs screen statements
January	RDC ranks statements
February	REB approves NYSDOT-sponsored statements
May	NYSDOT submits first-stage statements
August	TRB responds to first-stage statements
October	NYSDOT submits second-stage statements
January	TWGs rank second-stage statements
March	AASHTO Select Committee on Research selects problems to be funded
April	TRB solicits panel members
TCRP RESEARCH (ANNUAL)	
8/1-10/1	TR&D publicizes emphasis areas and solicits problem statements
8/1-12/31	TR&D and TWGs screen statements
January	RDC ranks statements
February	REB approves NYSDOT-sponsored statements, forwards them to FTA
September	FTA announces ranked list of statements and solicits panel nominees
POOLED-FUND RESEARCH (ANNUAL)	
8-1/10-31	TR&D publicizes emphasis areas and solicits problem statements
8/1-12/31	TR&D and TWGs screen statements
January	RDC ranks statements
February	REB approves NYSDOT-sponsored statements, forwards them to FHWA
March	TWGs rank statements approved by FHWA and recommend funding
June	FHWA announces ranked list of projects, TWGs decide funding commitments

Figure 1. Organization of the Transportation Research and Development Bureau.



member institutions: Brookhaven National Laboratory, Calspan/UB Research Center, City University of New York, New York University, Polytechnic University of New York, and the State University of New York (specifically the Buffalo College, Maritime College, Rockefeller Institute, and Stony Brook College). The Department has selected the consortium concept as the method of providing for its contract research needs, both because administrative delays are avoided that might result from conducting the program through a series of separate contracts, and because better management is provided through direct partnering with the consortium's engineering and scientific disciplines. Emergency research needs can also be accommodated more quickly with a consortium in place.

Applied and Basic Research

Applied research projects constitute the bulk of the Department's research program. They are usually of intermediate duration, lasting 1 to 3 years, and through directed research have good potential to produce immediate innovations in use of materials or equipment, or improvements to client techniques and procedures. The primary purpose is to answer a question or solve a problem.

Basic research projects are undertaken to identify major trends, variables, or conditions likely to concern clients in the longer term. The primary purpose is to increase knowledge.

Whether conducted in-house or through contract, both applied and basic research studies must be well planned and developed, preferably through a scientific approach, which is a consistent, well defined process providing identification of a research need, project funding and conduct, and implementation of findings.

Technology Transfer

All research activities contain some element of technology transfer, but when a project is undertaken specifically to use the results of research by others, and involves a significant investment of time, it is classified as technology transfer. Unlike applied or basic research, such projects do not involve directed research, but instead provide identification, review, summary, and ranking of prior research findings and recommendations.

Technical Consultation

These activities generally represent responses to urgent requests for assistance in solving problems encountered by operational personnel. This covers any subject where TR&D personnel are expert, including both engineering and statistical consultations. Most provide minimal opportunity for formal planning, although work of significant cost or complexity is conducted in formal research projects. Sufficient amounts of time are provided in the TR&D budget to accommodate anticipated requests for consultation that are not pursued in formal research projects. This provides researchers with opportunities to handle requests for assistance without negatively affecting the formal research program. TR&D continuously accepts requests for these services, encouraging operating units to submit requests for consultation because this provides reciprocal benefits. Operational problems are addressed, potentially leading to monetary savings, improved procedures, or greater safety. By looking into these problems, researchers gain insight into client operational procedures and problems, enhancing their research capabilities. These activities are not undertaken when the required expertise or equipment are not available within TR&D. Routine testing or product evaluations also are not conducted in this program.

The University Transportation Research Consortium (UTRC)

This is a group of colleges and universities, approved by FHWA and drawn from FHWA's Region I, under Department contract for specialized research of concern to specific NYSDOT programs. At this writing, it consists of the City University of New York as lead institution, and as member institutions: Cornell University, New Jersey Institute of Technology, New York University, Polytechnic University of New York, Princeton University, Rensselaer Polytechnic Institute, Rutgers University, the State University of New York, Stevens Institute of Technology, the University of Puerto Rico, and the University of the Virgin Islands. [*Note that there are two consortia: UTRC is an interstate organization, jointly administered and funded by USDOT (FHWA and UMTA) and NYSDOT. It should not be confused with TIRC, which is exclusively a New York State program working under contract to NYSDOT.*] The UTRC program is funded on a project-by-project basis, with half provided by federal grant and the other half by state funds. Normally, the state match is provided by the NYSDOT program agency requesting the work. Matching funding may also be contributed by other states, private industry, and local governments.

TR&D continuously accepts problem statements for UTRC projects, for approval by the Department's Research Executive Board as described in Chapter 3. After approval, TR&D also works with the involved NYSDOT program agency, the appropriate Technical Working Group (also described in Chapter 3), and the Contracts Management Bureau to complete the problem statement, review proposals submitted by UTRC members, approve the contractor, and develop the final contract.

FHWA also provides NYSDOT employees with educational opportunities through the UTRC program by furnishing half an employee's tuition, books, and fees up to $10,000 each year toward an engineering degree at a UTRC-member institution. NYSDOT is required to pay the remaining costs by direct payment to the member institution, or by providing in-kind services to that institution, or time for the student. FHWA selects scholarship recipients based on merit. Information and application assistance is available from either TR&D or the Training Bureau.

Non-Department-Sponsored Research

This is research available to the Department, but not principally financed through its budget. Schedules for these programs in which the Department is formally involved are given in Table 1.

The National Cooperative Highway Research Program (NCHRP)

This is a national program originating from an agreement between AASHTO (the American Association of State Highway and Transportation Officials) and FHWA with TRB (the Transportation Research Board). Under this program, states voluntarily pool 5.5 percent of federal-aid SPR funds to finance research activities managed by TRB and structured to respond to needs of state highway agencies. Because FHWA is responsible for federal-aid funds used in NCHRP programs, they review project content and contractor selection, but program selection and composition remain prerogatives of AASHTO and the participating state highway agencies.

Projects selected under this program tend to be of national interest. Annually, TRB solicits problem statements from the states, which are reviewed and screened by TRB, and then rated by the states. Projects eventually placed in the program are selected by AASHTO's Standing Committee on Research, with input from their Research Advisory Committee.

Although NCHRP is a national program whose contracts are managed by TRB, the Department is significantly involved in project selection. Early in the solicitation cycle, TR&D advises Department operational programs of the opportunity to submit problem statements for consideration. TRB reviews these statements and provides comments

to the proposers, who then may withdraw or provide more comprehensive statements. If the proposer does provide a revised problem statement, it and TRB's original comments are sent to the states, who ballot on each statement. Results of this balloting are considered by AASHTO's Standing Committee on Research (with input from their Research Advisory Committee), who finally decide which projects to fund.

Panels responsible for developing RFPs (Requests for Proposals) and reviewing the proposals submitted are appointed for each funded project. Nominees for these panels are solicited within NYSDOT through TR&D, and appointed by TRB based on their expertise in the research area involved. Contractors include private research firms, universities, nonprofit organizations, and consultants. State highway agencies may also submit bids, although panelists are prohibited from submitting proposals on behalf of their agencies. Once the contractor is selected, TRB is responsible for developing and managing the contract. TRB solicits problem statements annually according to the schedule given in Table 1. (NYSDOT's process for submitting and selecting potential NCHRP projects is described in Chapter 3.)

The Pooled-Fund Program

This is administered by FHWA and generally involves research on issues of regional concern. Like NCHRP, this program is financed by states voluntarily contributing their federal-aid SPR funds, except that these contributions are committed to specific projects rather than on a full-program basis. Pooled-fund projects are screened annually according to the schedule given in Table 1. FHWA starts the formal solicitation cycle by requesting problem statements, screens them, and asks each state to vote on worthiness of those surviving initial screening. Based on state responses, FHWA selects those that will be funded. Each project then is voluntarily financed by the states involved, which agree to commit specified amounts of federal-aid funds for a fixed period. NYSDOT has no responsibility in selecting the contractor or developing and managing the contract. (New York's process for submitting and voting on potential pooled-fund projects is described in Chapter 3.)

The Transit Cooperative Research Program (TCRP)

This is an applied research program similar to NCHRP, financed by the Federal Transit Administration and specifically providing solutions to problems of transit operators. TCRP annually solicits problem statements from the states according to the schedule given in Table 1. The Transit Development Corporation (TDC), a nonprofit agency, selects the problems that will be funded each year. States are asked to identify persons having expertise directly related to the proposed research to serve as panelists responsible for developing RFPs and selecting a research organization from those submitting proposals. NYSDOT statements submitted for TDC consideration are selected by the process described in Chapter 3.

FHWA Research Activities

FHWA conducts significant in-house and contract research programs to help advance transportation technologies, financed directly from their own administrative budget, in which NYSDOT has no role except for technology transfer of research results.

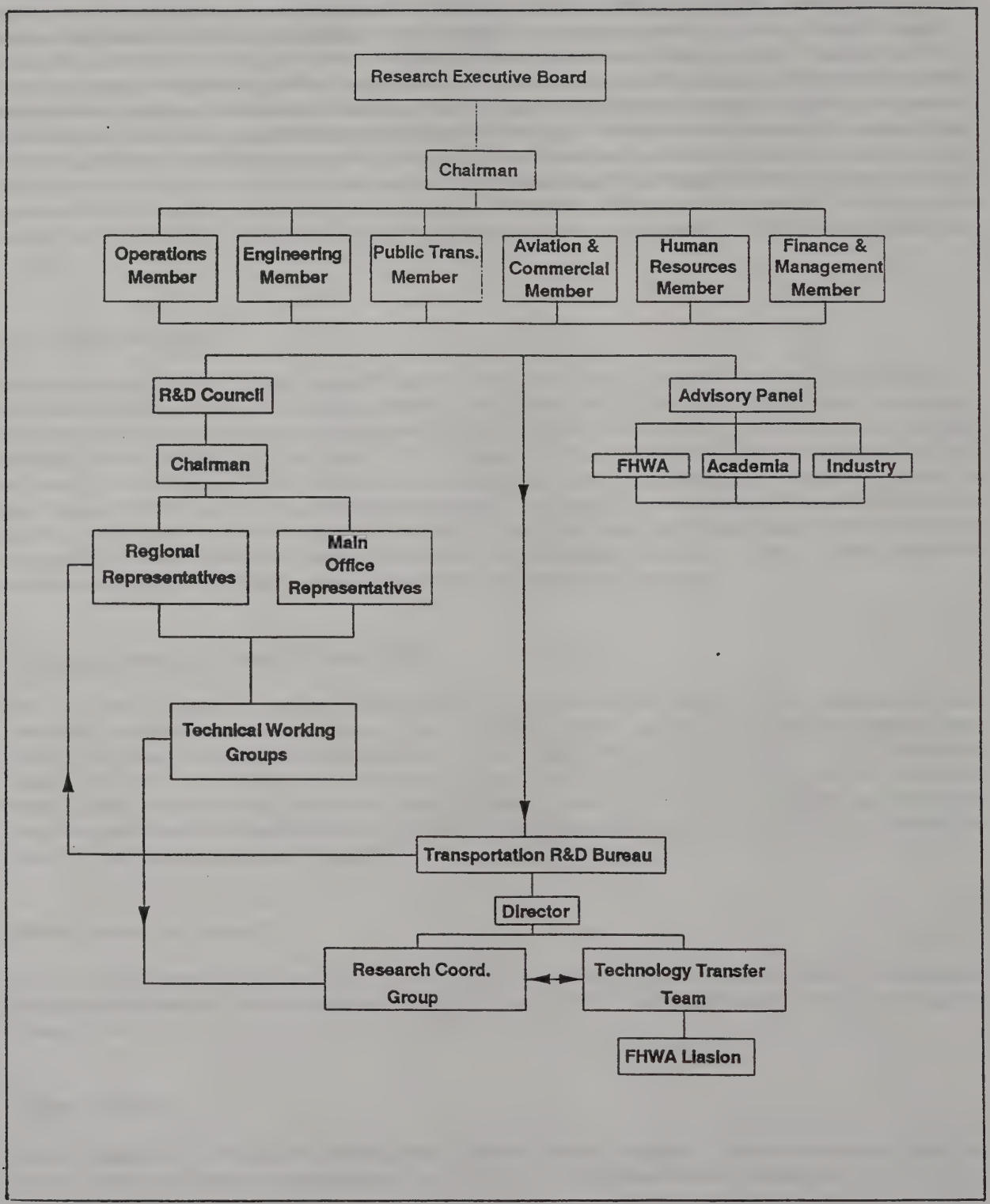
In-House Research

This is conducted at the Turner-Fairbank Research Center in McLean, Virginia. The work is generally aimed at study of chronic problems, special emergency investigations, and exploration of new technologies.

Contract Research

A significant portion of FHWA's RD&T activities is conducted under contract, an approach providing broad sources of special talent for practical, effective solutions to critical problems. Managed by the FHWA Turner-Fairbank staff, the work is done by large and small businesses and minority companies, including private research firms, universities, nonprofit organizations, and consultants. Most contracts are awarded on the basis of competitive responses to RFPs issued by FHWA. Some requiring special facilities are also awarded to state highway agencies or other federal laboratories. Opportunities are numerous for private, industrial, and university research agencies to participate in this contract program. A summary of proposed contract actions for the current fiscal year is available on request from FHWA's Office of Contracts and Procurement.

Figure 2. Organizational structure of the research, development, and technology-transfer program.



3. PROGRAM DEVELOPMENT

NYSDOT must ensure that its research program reflects both current and long-term needs, that studies conducted are comprehensive and responsive, and that all activities are centrally coordinated. This can best be accomplished by an interactive process for solicitation, identification, and ranking of researchable problems. The process should establish emphasis areas, provide organizational structures responsible and accountable for specific tasks, and include a firm schedule for accomplishing those tasks. Both process and organization should ensure participation of NYSDOT management, clients, industry, academia, and other governmental agencies.

Organizational Structure

NYSDOT's structure for development of its program is based on establishing committees with specific responsibilities for program review, ranking, and approval. This organization, illustrated in Figure 2, has been created because through committees, operational units maintain contact with the research staff and program, and are interactively involved in effectively selecting and conducting the program.

TR&D: The Coordinating Organization

TR&D is responsible for coordinating all Department research. Responsibilities include oversight of the formal interactive process to ensure that the overall program is responsive and comprehensive. Further, TR&D monitors the conduct of research through a management control system for funding and expenditures, to assure maximum use of research funds as well as technical quality of final products. TR&D must assure that the Department receives maximum benefit from all research through an active technology-transfer program, and must document program effectiveness by measuring benefits and arranging for periodic program evaluation.

Research Executive Board (REB)

This consists of NYSDOT executive managers from the Department's Main Office, representing each functional area. REB is chaired by the Director of the Technical Services Division, and members are appointed by the Assistant Commissioner for each functional area. REB provides policy guidance by identifying research-emphasis areas, formulating the budget, and approving the program.

Research and Development Council (RDC)

This consists of mid-level managers from the Main Office, again representing each functional area, and one mid-level manager from each of the Department's eleven regions. The TR&D Director is permanent chair. Their function is to guide REB by reviewing and ranking research problem statements, and recommending projects to REB for the next research work program based on NYSDOT strategic needs. All RDC seats are vacant every four years. Council members are nominated from the functional program areas and the regions, and ratified by REB.

Advisory Panel

This consists of members from industry, academia, and government agencies outside NYSDOT, invited by TR&D to consult concerning the overall program, serve as ex-officio RDC members and advise RDC on the RD&T program, and critique program performance. Members are invited to serve for specified time periods by the TR&D Director.

Technical Working Groups (TWGs)

These are established to provide technical expertise and assistance for each of the emphasis areas determined by REB. Each TWG consists of staff members from appropriate program areas selected based on their expertise. RDC determines the numbers of members and program areas represented on TWGs. TWG members are nominated by program areas, ratified by RDC, and serve through the research cycle. They are responsible for general oversight of research in their emphasis areas, including screening and selecting all problem statements for Department-sponsored research, and also for NCHRP, pooled-fund, and TCRP work. TWGs also vote the Department's ballot for all NCHRP second-stage problem statements and all proposed pooled-fund projects in their emphasis area. TWGs determine the extent of NYSDOT's participation in funding of pooled-fund projects selected by FHWA. TWGs participate in the Department's contract-research process by preparing such technical documents as problem statements and RFPs, evaluating resulting proposals and participating in selection of contractors and project managers, and participating in technology-transfer activities.

Process and Schedule for Department-Sponsored Research

NYSDOT's research program is developed in a two-year cycle, providing sufficient time for TR&D and clients to interact with the organizational committees to assure proper solicitation, ranking, and selection for the research program and budget. This schedule also provides enough time for the staff to conduct or contract out projects in a timely manner. NYSDOT now begins the process of soliciting problem statements in August of each odd calendar year.

Developing Research-Emphasis Areas

In June, just before the solicitation cycle, REB meets to develop the Department's research-emphasis areas. These are defined as major subjects of importance involving issues that must be addressed through research within three to five years. (REB has discretion in determining the process through which they identify emphasis areas, which may include use of a facilitator.) The process should include discussion of NYSDOT's mission and goals, the state's transportation and economic climates, problems facing the state's transportation system, and the Department's major categories of concern. Emphasis areas defined by REB are transmitted to TR&D by July 15.

Soliciting Problem Statements

NYSDOT's biennial research program emerges from a pool of problem statements submitted by its staff and operating units, as well as by contractors, consultants, and academia. These statements are collected through a formal solicitation process conducted by TR&D, which provides many benefits. Operating staff may expect objective review of their problem statements. Contractors can identify concerns from the own perspectives, which might have been overlooked by the Department. Academics can use their expertise to identify potential improvements of processes or materials.

TR&D begins soliciting statements in August of each odd calendar year by requesting them from Main Office, Regional, and Residency personnel. The call for topics is included in TR&D's Transportation R&D News (which circulates outside as well as within NYSDOT), and Technology News Transfer (circulated internally). The call includes copies of the standard research suggestion form (PHR 110a) and describes the emphasis areas developed by REB. (A sample suggestion form is shown in Figure 3.) Although suggestions are expected on topics within emphasis areas, proposers are encouraged to submit any topic of interest to ensure that a full range of issues is considered. Proposers must accurately and comprehensively complete the suggestion form, especially when documenting the nature of the problem and expected study results. This ensures that a suggestion is clearly understood so that objectives, accurate time and cost estimates, and the potential work plan can be developed A comprehensive problem statement also helps in determining if the problem is relevant, urgent, can be successfully addressed by research, and has an implementable solution. The solicitation period ends October 31, but proposers are encouraged to submit statements whenever they are completed, to avoid ideas being overlooked. Problems submitted after the end of the solicitation period are held for consideration in the next cycle.

Screening Problem Statements

All statements received by TR&D are tracked by the Bureau's Administration Section (as outlined in Appendix A), and each is reviewed by a staff member. Review assignments are based on the best match of topic with staff expertise and education. The reviewer should have at last two meetings with the proposer. The first involves the proposer in the review, ensuring that relevant facts and issues are described properly, and obtaining additional information that might have been omitted from the form. The statement can then be refined, or immediately classified as unsuitable for research, or as already under study. After this initial discussion, reviewers consult both the TWG for the appropriate emphasis area, and the managers whose work might be affected by the problem statement. These discussions should determine if the proposed study might improve operations. Both the TWG and affected manager are asked to assess potential for implementation. After these talks, the statement may be refined, rejected, or deferred if the operating agency cannot change current practice due to law, rule, regulation, or budget constraint.

Reviewers search the literature using TRIS, DIALOG, or other available information services. Library files and indices of professional societies and organizations are also consulted. The search should provide insights concerning the problem area, and help determine whether research similar or related to the proposed study has already been performed or is in progress. This information can help ensure comprehensive review of the problem, and avoid unnecessary duplication of ongoing or completed research.

TR&D should qualify and (when possible) quantify the direct dollar benefits of a proposed project. For example, if the anticipated result is reduction in quantity of material used or reduced long-term maintenance, quantitative savings can be estimated. In other cases, using work-zone safety as an example, quantitative benefits cannot be meaningfully estimated, and qualitative benefits thus must be described. In either case, it is important to document the benefits, so that potential value of the project to the Department can be accurately estimated.

Benefit calculations are often complex and require cooperation and concurrence of the proposer, TR&D, and affected agencies, but the method of calculating benefits must be consistent, and should be assessed quantitatively in accord with the "Guidelines for Calculating Benefits of Research" in Appendix B.

When the screening process is finished, reviewers complete a brief evaluation report (including an abstract) that summarizes the problem, research objectives, and expected benefits, and identifies the client(s). This report (presented in the outline form shown in Fig. 4) also contains a project overview and gives a recommendation for research classification from both the TWG and TR&D. The overview is their assessment of relevant issues involved in conducting the project, including potential statistical modeling and the expected implementing organization.

Figure 3. Form for proposing a research project (Form PHR 110a).

PHR 110a (11/95) RESEARCH PROJECT SUGGESTION FORM

TR&DB Use Only:
Suggestion No.: ____ - _____
Date Received: ____/ ____/____

NYS DEPARTMENT OF TRANSPORTATION
TRANSPORTATION R&D BUREAU
BLDG. 7A, ROOM 600, 1220 WASHINGTON AVENUE
ALBANY, NY 12232-0869

I. PROBLEM TITLE: _____

II. PROBLEM STATEMENT: _____

III. SPECIFIC RESULTS, FINDINGS, TOOLS, ETC., EXPECTED FROM THIS STUDY:

IV. EXPECTED BENEFITS:				V. WHAT IS NEEDED TO USE THE RESULTS:				
(Mark with an X)	Design	Construction	Operation	(Mark with an X)	Department	Contractors	Consultant	Public
Cost Reduction				Education				
Quality Improvement				Training				
Life Increase				Equipment: new ___ modified ___				
Safety Increase				Procedure Change				
Other _____				Process Change				
				First Cost-Increase				

CAN THE BENEFITS BE MEASURED OR DESCRIBED? PLEASE DO SO.

VI. WHEN RESULTS ARE NEEDED:

DESIRABLE YEAR _____
LATEST YEAR _____

VII. ASSESS LEVEL OF PROBLEM:

☐ DEPARTMENT - REGIONAL ☐ MULTI-STATES
☐ DEPARTMENT - STATEWIDE ☐ NATIONAL

VIII. SUBMITTED BY:

NAME _____ TITLE _____
AFFILIATION _____
ADDRESS _____
PHONE NUMBER (____) ____-_____ FAX NUMBER (____) ____-_____

Figure 4. Outline for screening of a research suggestion.

STAFF EVALUATION REPORT

I. PROBLEM NUMBER:

II. PROBLEM TITLE:

III. RESEARCH PROBLEM STATEMENT:

IV. OBJECTIVES:

V. PROPOSED RESEARCH:

Literature Review:

Proposed Research:

VI. RESEARCH PRODUCTS:

VII. URGENCY, PAYOFF POTENTIAL, AND IMPLEMENTATION:

VIII. COST AND DURATION:

IX. TR&DB RECOMMENDATION:

REFERENCES:

Figure 5. Form for in-house review of a proposed research project (Form PHR 111).

PHR-111(REV 12/95)

PROPOSED RESEARCH PROJECT REVIEW

PROBLEM NUMBER/TITLE:

REVIEWER:

CLASSIFICATION RECOMMENDATION

___ 1 - Research project, applied
___ 2 - Research project, fundamental
___ 3 - Technology Transfer
___ 4 - Consultation
___ 5 - Non-RDC consultation & T^2 (< $50k)
___ 6 - Not yet classified
___ 7 - Combined
___ 8 - Contract Research/UTRC (circle one)
___ 9 - Pooled Funds
___ 10 - NCHRP
___ 99 - Not appropriate for research

REASON FOR RECOMMENDATION

SECTION HEAD: _____

DIRECTOR: _____ DATE: ____/____/____

Resources required to completed the proposed work are estimated -- because of time constraints, these estimates will necessarily be approximate and appropriate only for programming purposes, but sufficient for reliable project classification and estimating the size of the future program.

Evaluation reports for problem statements not recommended for research, or those recommended for consultation and/or technology transfer estimated to cost less than $50,000, need not be as comprehensive as those recommending initiation of a formal study. Normally, this can be accomplished using TR&D's Form PHR-111, but that form (shown in Fig. 5) must be completed with enough information to support the recommendation.

All evaluation reports are included in a briefing book compiled by TR&D and forwarded to each RDC and Advisory Panel member by the first week in January of the solicitation cycle. Problems recommended for research are categorized in the briefing report as applied or basic research, technology transfer, or consultation effort. Those categorized as "research" include a recommendation for execution -- by Department staff when skills and resources exist in-house to complete the work, or by contract or by UTRC when skills and resources are insufficient in-house.

Ranking Problems

RDC is responsible for ranking problems proposed by TR&D as meriting consideration for NYSDOT-sponsored research, and for recommending to REB a list of those studies for addition to the on-going program. RDC can also add projects for consideration to those already proposed by TR&D. Ranking is completed in cooperation with the Advisory Panel. RDC makes their decisions at their January meeting during the odd-year solicitation cycle. Either RDC or the Panel may establish their own rules governing conduct of their meetings and how to judge the merits of each project. General evaluation criteria include determining that a statement addresses an emphasis area or other critical issue in need of solution, and that the work has high probability of success, does not duplicate other research, has acceptable budget and schedule, and may produce an implementable solution. RDC recommendations are documented by TR&D and forwarded to REB.

Approving the Program and Budget

REB approves the final program and budget, based on RDC recommendations. REB establishes their own rules governing conduct of their meetings, and meets in February of the cycle to approve the program and set budget for Department-sponsored research. At that meeting, in-house and UTRC projects are also approved and the overall program budget is established. REB also reviews and ranks problem statements for proposed contract research projects, and selects those for which RFPs will be prepared. For each project, REB identifies the TWG responsible for developing the RFP, evaluating submitted proposals, assisting in contractor selection, and selecting a project manager.

When REB announces projects approved for UTRC consideration, it is understood that required state matching funds cannot be federally reimbursed through the SPR funds or any other federal program. NYSDOT is obliged under the new federal rules to maximize their use of federal-aid SPR funds. Thus, it is unlikely that UTRC projects will be funded from the Department's contract-research budget, because that would reduce the funds available for SPR reimbursement. In all likelihood, state matching funds for UTRC projects must come directly from discretionary program funds. The final decision as to which projects are offered to UTRC will be made by the program manager responsible for providing funds for the state match, but that match may be shared with other states interested in the problem. TR&D will work with the program manager involved to determine if other states are willing to share the state match, and will arrange the funding agreements. The funding organization is also responsible for managing the contract.

The UTRC governing board solicits problem statements for their program annually. To accommodate UTRC in NYSDOT's biennial solicitation process, TR&D solicits UTRC problem statements each August. In the off-cycle year, TR&D works with the appropriate TWGs, advises both RAC and REB of all UTRC proposals, obtains recommendations and approvals from both groups, and notifies the program manager of their decisions. TR&D works with the contract manager to ensure that approved problem statements are submitted to UTRC during its solicitation period.

Process and Schedule for Non-Department-Sponsored Research

Although NYSDOT does not directly provide such funds, a significant portion of its available federal aid is used to fund NCHRP, TCRP, and pooled-fund projects. The Department must ensure that its interest in these programs is coordinated with its emphasis areas and its in-house, contract-research, and UTRC programs. TR&D, collaborating with the appropriate TWG and end-user programs, coordinates all activities involving NCHRP, pooled-fund, and TCRP programs. Problem statements are solicited for these programs during the normal biennial cycle. These statements receive the same TR&D/TWG review, RDC recommendation, and REB approval as projects recommended for NYSDOT-sponsored research. These programs also solicit problem statements annually. To accommodate their schedules, each August TR&D canvasses the Department for statements to be considered for these national programs.

In the off-cycle year, TR&D works with the appropriate TWGs, advises both RAC and REB of all proposals, obtains recommendations and approvals from both groups, and notifies proposers of their decisions. For all REB-approved problems, TR&D works with the proposer and TWG in drafting and submitting the final problem statement. Both NCHRP and the pooled-fund program ask states to rate or rank the final list of problem statements. The appropriate TWG does this for statements within its emphasis area. TR&D notifies the TWGS and provides ballots at the appropriate time in the schedule.

4. CONDUCT AND CONTROL OF PROJECTS

This chapter describes procedures for efficient, effective conduct of the Department's research. These procedures are designed to ensure that research progresses according to a well-thought-out plan, that activities and findings are documented, and that project costs are captured.

Establishing Project Identification Numbers (PINs)

PINs are established for all in-house research studies, consultations with expected budgets greater than $10,000, and other consultation and implementation work when requested by the principal investigator. PINs help in tracking total and relative costs over the lives of specific projects. They are used on all accounting documents, including timesheets to document personal service costs, expense accounts, and other costs billable against a project. (TR&D's procedure for establishing PINs is given in Appendix C.)

Study Proposals/Work Plans

These are prepared for all in-house research projects. Acceptable study proposals are well-thought-out documents establishing the need for the project, clearly defining its objectives, providing a detailed work plan for accomplishing those objectives, and indicating how research results will be used. (This Manual's Appendix D "Guide for Preparing TR&D Study Proposals/Work Plans" explains in detail what this document should contain.) Study proposals are reviewed by TR&D section supervisors and approved by the Director. Review and approval are based on both technical and managerial evaluation of the document, to ensure that the problem has been adequately defined, the experimental method and proposed data analysis are adequate, possible solutions are defined, and funding and estimated time to completion are reasonable. Study proposals need not be prepared for consultation, implementation, or other projects not classified as "research," but it is recommended that the principal investigator prepare an outline detailing conduct of such studies before starting work.

Interim and Final Reports

These document RD&T studies and activities. *Interim reports* document specific phases of a project, and are prepared when early communication of significant findings is appropriate. *Final reports* address all the objectives and areas of investigation stated in the study proposal or work-plan outline. All interim and final reports published by TR&D are forwarded to the FHWA, to project clients, and to potential end-users. ("Procedures for TR&D Publications and Correspondence," providing guidelines on content and operations for the several types and series of reports published by the Bureau, are given in Appendix E.)

Contract Research and UTRC Projects

The goal of the contract-research program is to conduct investigations outside the Department in a variety of transportation fields, leading to products, information, or technology both useful to the Department and appropriate

for integration into its programs. The contract manager is responsible for assuring that a NYSDOT research contractor conducts and controls a project according to Department expectations and the study objectives. The manager oversees conduct of the work, reviews progress reports, authorizes payments, evaluates final reports, and when applicable implements research findings or recommendations. (TR&D's "Guidelines for Contract Research Project Managers," providing information and instruction about responsibilities of their assignments, are given in Appendix F.) The contract manager is also responsible for documenting contractor performance by completing interim consultant evaluations at appropriate intervals and a final evaluation at project conclusion. TR&D will send evaluation forms to the project manager at appropriate times -- when the manager completes these forms, they must be sent in confidential envelopes to the Contract Management Bureau.

Data Management Procedures

Most research projects involve collection of data, the amount and type depending on the nature of the particular study. Occasionally, after completing a project the data must be revisited for further analysis or review. To assure that data are retrievable, TR&D has developed the management procedures given in Appendix G.

Policies Governing Daily Conduct of Research Employees

Like all other New York State and NYSDOT employees, research personnel are subject to numerous policies, rules, and regulations affecting and controlling their daily conduct. Among these, too numerous to repeat in this Manual, are many covered in the current NYSDOT *Employee Handbook*, issued to all new personnel when initially reporting to work and updated periodically thereafter. Employees are expected to be familiar with its contents, including many details that are contractually binding. Research employees also are advised to confer with the Bureau's Administrative Officer, union steward, or direct supervisor for questions concerning general rules, laws, policies, and regulations affecting everyday conduct, as summarized in Appendix H.

5. PROGRAM EVALUATION

This is an important function for any RD&T organization. Correct evaluation procedures ensure maximum use of research funds and provide systems to track accomplishments in relation to expectations. They also provide mechanisms to determine effectiveness of the overall RD&T management process, and furnish means of measuring program benefits. Program-evaluation concepts can also be applied at the project level when an independent evaluation is desirable for research ideas, techniques, or implementation procedures.

Annual Work Program Report

This TR&D report is a summary statement of activities that qualify for federal SPR reimbursement, and are to be performed in the program period (generally the following federal fiscal year). It includes RD&T activities not reimbursable from SPR funds, including UTRC contracts. It is forwarded to FHWA before the program period begins, and is used to maximize use of federal-aid funds, assuring that they are expended on actual RD&T activities. It includes a table summarizing all projected SPR and non-SPR disbursements for RD&T for the coming period, itemized by project or expenditure category, including those for pooled-fund, TCRP, and NCHRP projects. Factors for salaries include estimated fringe-benefits for the period. The table is supported by the following:

1. Project status reports for all studies in progress. (These reports are described in Appendix I.)

2. An itemized list of all research and consultation projects not yet begun, including estimated costs for each during the period.

3. An itemized listing of all pooled-fund projects, including estimated costs for each during the period.

4. General descriptions of scope, objectives, and progress for each project.

Semi-Annual Progress Report

This TR&D report supplements the annual work program report, describing accomplishments for the previous six months and anticipated project plans for the next six months for all RD&T activities. Semi-annuals prepared for the second half of a federal fiscal year are combined in a single document with the following year's work program. Semi-annual reports provide an adjusted SPR fiscal-year project summary table, a revised list of projects and consultations not yet initiated, a revised pooled-fund table, a list of publications issued during the period, and updated status reports for all projects underway.

Program-Level Peer Exchange

One of the more significant rulemaking changes in 23 CFR 420 Subpart B (State Planning and Research Program Administration) requires that FHWA establish a peer-exchange program to evaluate state-administered research programs funded with federal monies. Peer exchanges are not meant to evaluate content of RD&T programs, but rather to assess the management process and identify, reinforce, and spread word of effective program approaches,

for nationwide sharing of successful practices. Under this rule, NYSDOT must periodically conduct a peer exchange of its RD&T program, and participate in this process for other states' programs. NYSDOT initiates the peer review, selecting members of the review team (normally five or six persons from the transportation or research communities). At least two persons are selected from a list of qualified peer reviewers maintained by FHWA. The team works according to procedures developed by FHWA, and provides a written report of findings to the Department, which is then forwarded to FHWA's Division Office along with NYSDOT's written response to these findings.

Project-Level Peer Review

This provides opportunities for independent evaluation of research concepts, techniques and experimental designs, and implementation processes for selected in-house research projects. TR&D's "Project-Level Peer-Review Process," providing guidelines for selection of projects and peer-reviewers, and the review process, is outlined in Appendix J.

Performance Measures

Expenditure of public funds is subject to careful scrutiny, especially for research organizations whose value is subject to investigation from outside NYSDOT as well as by managers of the organizations they serve. Performance measures are a method for unbiased evaluation of both specific projects and the overall program. They are also benchmarks in highlighting strengths and weaknesses of an organization and its program. TR&D computes and publishes its own performance measures for each federal fiscal year. These are included in its briefing report, when that biennial publication coincides with the cycle for soliciting problem statements. TR&D also publishes a separate performance-measure report in the solicitation-cycle off-year, giving measures for all major TR&D activities. These measures serve two purposes: overall benefits give a quantitative assessment of program effectiveness, and other measures assess the efficiency of various program components. NYSDOT managers may use these measures in effectively monitoring and controlling the research program, but none of these measures address the fundamental question of quality or true worth of a well conducted research program, and are no substitute for concerned, involved management.

Benefits

These are the most important performance factors for the research program, providing the only quantitative means of measuring program effectiveness and providing management a clear picture of the value of research to the Department. Future management decisions regarding the research organization and program are based primarily on management's assessment of research benefits. TR&D's procedure for measuring benefits involves calculating monetary benefits for work or projects completed in the previous federal fiscal year. Benefits are derived from 1) NYSDOT's capital budget: savings in out-of-house costs of construction, 2) NYSDOT's operating budget: savings of in-house costs, such as design and maintenance, and 3) safety and user benefits: savings associated with safer highway conditions or those resulting from reduced travel time and vehicle operating/maintenance costs.

Benefits are determined in consultation with end-users or implementing organizations, using present worth based on a five-year life (beginning from initial implementation of research results). They are reported on an aggregate basis for completed in-house research, contract research, technical consultations, and technology transfer.

(Methods and procedures used to calculate benefits are described in "Guidelines for Calculating Benefits of Research," Appendix B.)

In-House Research

Satisfactory completion of research projects may lead to positive changes affecting quality and cost-effectiveness of NYSDOT processes, procedures, and materials. Thus, it is important to monitor costs and lapsed time to ensure that projects stay on schedule. These are measured 1) as percentage over/under-runs of the original estimated project duration and budget for completed projects, and 2) as the ratio of percent budget spent to percent time lapsed for on-going projects. Expenditures used in computing budget measures are those reported by NYSDOT's internal-accounting system. The aggregate project benefit-cost ratio is reported for projects completed in the cycle. This is calculated by dividing aggregate benefits for completed projects by their aggregate lifetime costs, as reported by NYSDOT's internal-accounting system.

Contract Research

The aggregate project benefit-cost ratio is also reported for contract-research projects completed in the cycle. This is calculated by dividing aggregate benefits for completed projects by their aggregate lifetime costs, as reported by NYSDOT's internal-accounting system. It is not necessary to report time and budget performance measures for contract-research projects. The contract manager is responsible for keeping a contract project on time and within budget, as described in TR&D's "Guidelines for Contract Research Project Managers" in Appendix F. The contract manager should verify that the contractor's ability to conduct the work on time and within budget is fully reflected in the contractor's confidential performance evaluation, which is completed by the contract manager, discussed with the contractor, and filed with the Contracts Management Bureau.

Technical Consultations

These allow NYSDOT program managers to use the research staff's specialized knowledge and experience in defining and solving problems of limited scope, usually resulting in a report to the client. These services are of value to the Department, the underlying assumption being that if they were not available from TR&D the client would incur an equivalent cost for outside consulting work. This value, recorded as a performance measure, is the cost of these services as reported by the Department's internal-accounting system. Implementation activities to take advantage of research conducted elsewhere are included in this measure.

Technology Transfer

These activities facilitate sharing of technical information within the Department. TR&D's new roles and responsibilities require an aggressive program of acquiring, evaluating, and marketing completed research products of others. Performance measures include the numbers of technology-transfer initiatives by the research staff over the federal fiscal year.

Overall Effectiveness

The program's total benefits are aggregated over the most recent three-year period, and divided by the total cost of research as reported by the Department's internal-accounting system over the same three-year period in which the projects were completed. This figure is reported as the program's effectiveness measure. This is an important performance factor, because it provides a clear benefit-cost ratio for the program. It assumes a relatively stable program, and recognizes that completion of research or implementation of its results do not occur in predictable cycles. Calculating a rolling three-year average smooths out fluctuations in the data, and presents a truer picture of the organization's value than a one-year average. The target for any research organization is having its effectiveness

measure exceed one. When that occurs, total costs of research (from any source) are completely covered by the program's benefits. Target effectiveness, however, should not be confused with desirable effectiveness. The research organization should work to continually improve its effectiveness, both to provide a high value for the organization and to make apparent the benefits of a continued research presence.

6. TECHNOLOGY TRANSFER AND IMPLEMENTATION

Definition

Technology transfer is the process through which research findings and new or underutilized technologies are systematically transformed into useful processes, products, and programs. The goal is to expedite use of information proved through research to improve transportation systems, providing a necessary link between research and operations, and bridging the gap between theoretical knowledge and its practical application.

Objectives

New technologies must be applied in maintaining and managing the transportation infrastructure, to remain competitive and maintain both operational efficiency and cost-effectiveness. Program objectives include:

1. Maximizing return on research investment.
2. Expediting implementation of results through timely, widespread adoption of innovative technologies.
3. Identifying new technologies, experiences, and practices of others.
4. Avoiding unnecessary duplication of expensive research.
5. Maximizing cost-effectiveness of NYSDOT operations and optimizing allocation of limited resources, through deploying more cost-effective materials, equipment, and processes.
6. Keeping NYSDOT up-to-date with latest technological developments by providing a "window" to the external world of research, and integrating innovative technologies into all appropriate Department programs.
7. Creating effective, mutually beneficial relationships with others in the transportation research community.

Activities

TR&D's primary technology-transfer responsibility is efficient assistance in implementing new technologies and products resulting both from Department-sponsored research and from studies completed by other regional or national research organizations. Through this program, TR&D performs three tasks:

1. Facilitating implementation of NYSDOT-sponsored research results produced by in-house, contract, and UTRC programs.
2. Closely monitoring national and regional research activities performed through NCHRP, TCRP, and FHWA's internal, contract, and pooled-fund programs. (These activities were described in Chapter 2.) TR&D facilitates implementation of resulting useful technologies.

3. Maintaining an effective network with other regional and national information programs and with suppliers of technology transfer, and disseminating information to keep NYSDOT abreast of latest developments in transportation systems, to facilitate implementation of useful technologies. These programs include:

- The Highway Innovative Technology Evaluation Center (HITEC)

This independent, nonprofit organization was created by AASHTO, FHWA, and the Civil Engineering Research Foundation to evaluate new products, equipment, and services for which industry standards do not exist. Technical-evaluation panels plan and conduct product/technology-specific evaluations. TR&D disseminates HITEC evaluation results to end-users and TWGs, and assists in recruiting volunteer panel members from within the Department.

- National Technical Product Evaluation Program (NTPEP)

This was established by AASHTO to provide testing for member DOTs of products, materials, or devices for which industry standards do exist. Project panels establish work plans, evaluation procedures, and tests for specific products, based on input from member states. TR&D disseminates NTPEP evaluation results to end-users and TWGs, and assists in recruiting volunteer panel members from within the Department.

- Local Technology Assistance Program (LTAP)

This program is jointly sponsored by FHWA and NYSDOT to provide workshops and training, and to deliver modern technology to municipal, town, and county transportation agencies. LTAP works through a network of centers under contract to and located in each of the 50 states and in Puerto Rico. FHWA approves the work plan and budget, based on NYSDOT recommendations, and NYSDOT manages the contract for the LTAP center in New York State. LTAP is an effective technology-transfer provider, whose resources serve the entire range of highway jurisdictions in this state. Its program makes available packaged materials, including educational kits, training courses, and manuals, and disseminates information to large numbers of potential users. TR&D maintains a strong liaison and has a record of cooperation and coordination with LTAP. This helps the Bureau take advantage of its technology-transfer resources while providing assistance to local highway jurisdictions. (The Cornell University Local Roads Program has contracted as NYSDOT's LTAP provider through December 2001.)

- Experimental Projects Program

This FHWA program helps the Department conduct in-service evaluations of new or innovative or proprietary materials that have not been previously tested. Funding is provided through work orders issued by FHWA under an existing federal-aid agreement, normally for a specific construction project, after they review and approve NYSDOT's installation and evaluation plan. Experimental projects usually require an installation report, periodic performance surveys, and a final report. (FHWA's report form is shown in Figure 6.) TR&D is responsible as the main contact point between FHWA and NYSDOT agencies interested in installing experimental features. TR&D collects and submits experimental-project reports, and works with end-user organizations and TWGs to disseminate experimental results.

Figure 6. Form FHWA 1461 applying for federal approval and funding of an "experimental project."

RCS HHO-30-19

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

EXPERIMENTAL PROJECT REPORT

EXPERIMENTAL PROJECT

EXPERIMENTAL PROJECT NO. [1] STATE YEAR NUMBER SUF. ☐☐☐☐-☐☐ ☐

CONSTRUCTION PROJ. NO. [8]

LOCATION [28]

EVALUATION FUNDING [48]
1 ☐ HP&R 3 ☐ DEMONSTRATION
2 ☐ CONSTRUCTION 4 ☐ IMPLEMENTATION

NEEP NO. [49] ☐☐

PROPRIETARY FEATURE? [51]
☐ YES
☐ NO

SHORT TITLE

TITLE [52]

THIS FORM

DATE [140] MO. YR. ☐☐-☐☐

REPORTING [144]
1 ☐ INITIAL 2 ☐ ANNUAL 3 ☐ FINAL

KEY WORDS

KEY WORD 1 [145]

KEY WORD 2 [167]

KEY WORD 3 [189]

KEY WORD 4 [211]

UNIQUE WORD [233]

PROPRIETARY FEATURE NAME [255]

CHRONOLOGY

Date Work Plan Approved: MO. YR. ☐☐-☐☐ [277]

Date Feature Constructed: MO. YR. ☐☐-☐☐ [281]

Evaluation Scheduled Until: MO. YR. ☐☐-☐☐ [285]

Evaluation Extended Until: MO. YR. ☐☐-☐☐ [289]

Date Evaluation Terminated: MO. YR. ☐☐-☐☐ [293]

QUANTITY AND COST

QUANTITY OF UNITS *(Rounded to whole numbers)* [297]

UNITS [305]
1 ☐ LIN. FT. 5 ☐ TON
2 ☐ S.Y. 6 ☐ LBS.
3 ☐ S.Y.-IN. 7 ☐ EACH
4 ☐ C.Y. 8 ☐ LUMP SUM

UNIT COST *(Dollars, Cents)* [306]

AVAILABLE EVALUATION REPORTS

[315] ☐ CONSTRUCTION ☐ PERFORMANCE ☐ FINAL

EVALUATION

CONSTRUCTION PROBLEMS [318]
1 ☐ NONE
2 ☐ SLIGHT
3 ☐ MODERATE
4 ☐ SIGNIFICANT
5 ☐ SEVERE

PERFORMANCE [319]
1 ☐ EXCELLENT
2 ☐ GOOD
3 ☐ SATISFACTORY
4 ☐ MARGINAL
5 ☐ UNSATISFACTORY

APPLICATION

[320]
1 ☐ ADOPTED AS PRIMARY STD.
2 ☐ PERMITTED ALTERNATIVE
3 ☐ ADOPTED CONDITIONALLY
4 ☐ PENDING
5 ☐ REJECTED
6 ☐ NOT CONSTRUCTED

(Explain in Remarks if 3, 4, 5, or 6 is checked)

REMARKS

[321]

[700]

FORM FHWA 1461 (REV. 8-79) Previous Editions are Obsolete

- Intelligent Transportation Systems (ITS)

Formerly called IVHS (for Intelligent Vehicle Highway Systems), ITS uses proved new technologies (including information processing, communications, computer control, and electronics) to help increase safe, efficient operation of New York's multimodal transportation systems, and help address a variety of other transportation needs. ITS applications are resulting in new management, control, and information systems that improve safety, reduce congestion, enhance mobility, minimize environmental impacts, and promote economic productivity.

The Technology-Transfer Network

Administrators

Technology transfer is conducted primarily by TWG members, with TR&D providing overall guidance for assessment, packaging, planning, promotion, and delivery strategies. TR&D maintains a strong liaison with NYSDOT customers and end-users, including all TWGs, its research and technology-transfer partners, and FHWA (which advises on technology-transfer strategies).

Partners

Technology transfer is a team effort requiring active participation of many parties, both within and outside the Department, including FHWA, TRB, NCHRP, AASHTO, the National Highway Institute, professional organizations, trade associations, universities and colleges, vendors, and users. All these partners work together, share information, and aid one another. Effectiveness of the technology-transfer process is a function of team-member cooperation and efficient execution of respective functions. TR&D maintains an effective partnership with members of the transportation community.

Customers

Beneficiaries of research implementation are New York State's citizens in particular and the transportation community in general. Technology-transfer activities are directed to NYSDOT employees, with the larger transportation community also served -- local and regional transportation agencies, users, etc.

Outreach Activities

TR&D in coordination with TWG members conducts the following activities:

1. Continuously assesses end-user needs, maintaining effective liaison with NYSDOT staff.

2. Maintains an effective two-way communication network with national and regional research programs to share Department activities and stay up-to-date with latest developments. This entails participating in national and regional conferences, seminars, and meetings.

3. Tracks internal and external research-in-progress to assess whether application of findings address existing or anticipated NYSDOT needs.

4. Performs packaging, planning, promotion, and delivery functions for selected technology-transfer products conceived through Department-sponsored research or through activities elsewhere.

5. Assists with follow-up evaluations and provides a feedback loop for implemented products.

6. Makes staff expertise available to NYSDOT employees and programs.

The Technology-Transfer Process

Technology transfer is a six-step process: 1) identification/assessment, 2) planning, 3) refinement/packaging, 4) promotion/delivery, 5) evaluation, and 6) adoption.

Identification/Assessment

In this phase, TR&D closely monitors research-in-progress and other activities of information producers and suppliers of technology-transfer information, screens technology items for relevance and applicability, and determines which can or cannot be directly implemented, and which require further development. Products generated from NYSDOT-sponsored research are also monitored. In collecting information, methods include use of on-line databases, library resources, and two-way communication systems with national and regional technology-transfer suppliers and information producers. Of the computerized databases in which research information is collected, including the worldwide web, TRIS (the Transportation Research Information Service) is the most comprehensive transportation system available. TR&D relies primarily on this database to identify new technologies. In assessing information, coordination is needed for researchers who develop products, potential users, and TWG members performing delivery activities. When identifying information, TR&D is aware that such information must be relevant and have significant potential benefit. The product must be responsive to needs of program managers so as to ensure effectiveness and viability -- the user must need the information and the technology. As mentioned, the program's assessment element is focusing on several producers of technology: HITEC, NTPEP, ITS regional and national programs, NCHRP, TCRP, UTRC, and FHWA contract, internal, pooled-fund, and experimental-features programs, as well as the Department's own research programs (both in-house and contract).

Planning

For each new technology, TR&D identifies the end-user agency and appropriate TWG. TR&D and the TWG analyze and estimate the benefits of implementing new technology, and determine promotion mechanisms and delivery strategies (including identification of barriers and how to overcome them) that will most effectively accomplish technology transfer.

Refinement/Packaging

In this phase, TR&D and the TWGs explore appropriate techniques for presenting new technologies and products to end-users, and whether language and format of the information is suitable. They thus should consider 1) educational and professional background of users, 2) need for the technology, 3) degree of difficulty in its implementation, and 4) cost of implementation.

Promotion/Delivery

TR&D and the TWGs advise the targeted audience of existence of the new technology/product. Emphasis is placed on motivating the audience to learn about new technologies and highlighting how users will benefit from implementing the information or product and the needs it can meet. The key to a successful technology-transfer program is effective marketing. NYSDOT's program primarily emphasizes integrating marketing concepts with promotion of new programs and technology. It uses basic marketing principles by focusing on customer satisfaction and quality management. Combining these principles with technology transfer helps achieve an effective, efficient process. Generally, promotion and delivery vehicles include newsletters, workshops, reports, study progress reports, research summaries, and training seminars. Promotional elements must be direct and user-friendly. Promotional literature may be provided by product developers (researchers) or produced by TR&D in coordination with the TWGs. In either case, information must be provided in a timely, useful manner, because end-users often have no time for complicated materials. Delivery functions are being carried out by TWG members, with TR&D providing general guidance concerning appropriate strategies, scheduling, and delivery materials. The TWG role is to facilitate adoption, using its own members qualified for such work. As mentioned, partners in technology transfer also include NYSDOT's own UTRC researchers and FHWA, some executing delivery functions and others acting as program advisors. Persons involved in technology transfer are encouraged to seek FHWA input on issues related to any of these activities.

Evaluation

At this stage, users apply information presented to their own situations, and determine its suitability. In addition to such pre-implementation evaluation by the user, viability of the technology is further assessed after implementation, with TR&D assisting in follow-up evaluations. User feedback is solicited to help measure effectiveness of individual products, as well as the overall program,

Adoption

A good measure of adoption of a new technology/product is when change occurs in guidelines, specifications, standards, policies, or wider use of ideas. NCHRP has developed an implementation-practices checklist as an aid in successful implementation and adoption activities, which is included in this Manual's "Bookshelf" (Appendix K).

APPENDIX A
TRACKING SYSTEM FOR RESEARCH SUGGESTIONS

The TR&D Bureau uses the computerized system described here to track suggested research problem statements in the problem-solicitation and screening phases of the research suggestion cycle. The tracking system has two components:

1. Monitoring status of all research suggestion from the time first received by TR&D until their disposition.

2. Assuring that all required tasks in the problem suggestion-and-evaluation process are completed in a timely manner.

The Administration Section is responsible for system operation. Weekly status reports are provided to the Sections on Fridays for information and updating purposes. Status reports also note whether required tasks are overdue. Bureau Sections are responsible for marking changes on forms and returning them to Administration by the following Thursday morning. All forms should be returned by Thursday, regardless of whether changes have been made.

The tracking system is programmed in dBASE III Plus, and includes the following features:

1. Problem Statement Number: YY-XXX

   YY = year submitted
   XXX = problem number (assigned sequentially by the Administration Section as problems are received)

   The cutoff data for problem submission is October 31. Problems received after that date will be considered in the next research cycle and are numbered with the following cycle's year of submission.

2. Date Received

   The date the statement is received and mail-stamped by the Administration Section.

3. Problem Title

   Originally, the title submitted is entered, but can be changed if ambiguous or inappropriate for some reason. To reduce the possibility of confusion, however, any changes should be made as soon as possible after the statement is received, and if possible limited to a single change.

4. Acknowledgment Letter (Receipt) : Y/N Date

   Indicates whether a letter of receipt has been sent to the submitter. This is a short form letter intended solely to acknowledge receipt of the statement, but providing no details concerning suggestion status or disposition. The Administration Section is responsible for letter issuance, which should be completed within three calendar days of the statement's receipt (Item 2).

5. Section Assignment: EXT _____ Date Assigned

   X = 2, 3, or 4 (2 = Structures, 3 = Materials/Pavements, 3 = Technology Transfer)

   The Director assigns the problem to a specific Section after the statement is received. Date of assignment is automatically read from the computer internal clock. (This date can be edited if necessary.)

6. Reviewer and Date

   Person assigned by a Section head to process the statement from reception up to its recommended disposition. Reviewer must be selected within two calendar days after the statement is assigned to a Section (Item 5).

7. Contact Submitter and Date

   Reviewer must contact submitter to assure common understanding of the statement and objectives. Initial contact must occur with five calendar days of date of assignment (Item 6)

8. Client Name: X-___

   X= NYSDOT functional unit

   1 = Design, 2 = Structures, 3 = Construction, 4 = Materials, 5 = Geotechnical Engineering, 6 = Maintenance, 7 = Equipment Mgt, 8 = Transportation Planning, Highway Safety, and Traffic Engineering, 9 = Region and Number, 10 = Other

9. Contact Client and Date

   Reviewer must contact client within five days of the review assignment by standard memo to gage level of support for the suggestion, and assure a common understanding of the problem statement and objective(s). Reviewer is also responsible for contacting TWG most closely associated with the suggestion. Reviewer works with this TWG to clarify the problem, confirm the client, screen the statement, and receive TWG recommendation concerning a performing agency. No contract data should be entered until reviewer has communicated with both the client and TWG.

10. Problem Classification: X-_____, combined with:

    Form PHR-111a:_____ Y/N Date: _____
    Revised PHR-111a: _____ Revised Y/N Date: _____

    X = 1, 2, 3, 4, 5, 6, 7, or 99 (1 = Research Project, Applied, 2 = Research Project, Basic, 3 = Technology Transfer, 4 = Consultation, 5 = Consultation & Technology Transfer (<$50k), 6 = Combined, 7 = Not Yet Classified, 99 = Not Appropriate for Research

    The reviewer classifies the problem in coordination with TWG. Original classification can be revised at any time before submission of final recommendation. Form PHR-111 must be completed when classification or change of classification is made. Date of classification is read from the internal clock and can be edited if necessary. Classification must be completed within 22 calendar days of the date the statement is assigned to a Section (Item 5). When using Code 7, the reviewer must advise Administration Section to remove one problem number from further reporting in the system. When using Code 99, Form PHR-111 should be completed for inclusion in the briefing book.

11. Date Literature Search Completed

    Reviewer must complete the initial search within 10 calendar days of being assigned the statement (Item 6).

12. Draft Briefing Book Insertion of Recommendation and Date

    This must be completed within 20 day of original problem classification (Item 10).

13. Final Briefing Book Insertion and Date

    This must be completed by January 15. Completing the draft insert (Item 12) triggers a warning to complete this task.

14. Performing Agency: X-_____

    X = 1 = TR&D, 2 = NCHRP, 3 = Pooled-Fund, Regional, 4 = Pooled-Fund, National, 5 = TCRP, 6 = UTRC, 7 = Contract Research

    The reviewer recommends the performing agency for each problem recommended for research (Classifications 1 through 6).

15. Warnings

    These are issued when steps in the process are omitted or lag behind schedule.

FORM 1: BENEFIT CHECKLIST

Benefit Areas and Specific Benefits	Net Benefits
CAPITAL PROGRAM	
Labor	
Materials	
Equipment	
Service Life	
Contract Duration	
Other:	
Other:	
OPERATING PROGRAM	
Maintenance Frequency	
Maintenance Equipment	
Maintenance Labor	
Maintenance Materials	
Design Procedures	
Other:	
Other:	
SAFETY AND USERS	
Accident Frequency	
Accident Severity	
Other:	
Other:	
Travel-Time Savings	
Vehicle-Operating Costs	
Other:	
Other:	

NOTE: Additional benefits may exist and should be added if monetary amounts are significant

APPENDIX B
GUIDELINES FOR CALCULATING BENEFITS OF RESEARCH

This appendix presents guidelines for analysis and calculation of benefits from completed and proposed research projects, including the life-cycle and present-worth methods used by the Transportation Research and Development (TR&D) Bureau. These procedures were designed to estimate monetary values in three areas:

1. **Capital Program Benefits**: primarily savings in the Department's out-of-house expenses (such as contract construction), discussed here in terms of 1) labor, 2) materials, 3) equipment, 4) longer service life, and 5) contract duration.

2. **Operating Program Benefits**: savings affecting the Department's in-house expenses, discussed here in terms of 1) maintenance, and 2) design procedures.

3. **Safety and User Benefits**: savings associated with improved highway safety (in terms of accident frequency and severity) and both reduced travel time and vehicle operating/maintenance costs for users.

This benefit-analysis procedure involves calculating net annual benefits for each project within these three benefit areas, and converting net annual totals to five-year life-cycle, present-worth costs. "Net benefits" are defined here as aggregate benefits, minus all resulting increased costs of implementation (such as labor, materials, or equipment). When calculating research performance measures, benefits may be totaled into one single figure. When calculating benefits for proposed projects, benefits should be reported for each of these three benefit areas on a project-by-project basis. Benefits of research may be calculated using the following four-step procedure.

Step 1: Identify Benefits

This involves matching a projects's benefits into one or more of these three broad benefits areas, as well as against specific benefits within each area. This step is important to avoid overlooking anything that could significantly affect the results. The checklist in Form 1 is used, listing the specific benefits found in each area. (Additional information about these specific benefits is given later in these guidelines.) Benefits analyses are often specific to a particular project, and benefits may result other than those listed on Form 1. If such benefits are found, they should be included in the appropriate area and listed under "other." This step also includes identifying any increased costs associated with implementing research recommendations. Increased costs should be calculated annually by benefit area, and subtracted from the benefits before converting the area totals to present-worth values.

Step 2: Define Target Area

This involves identifying specific geographic areas of New York State that will be affected by a project's results. This is important, especially in terms of regional areas, because certain costs vary significantly according to geographic location. "Regions" are defined as follows for benefit calculations:

1. **Upstate**: all locations except Bronx, Kings, Nassau, New York, Queens, Richmond, and Suffolk Counties.

2. **Metropolitan**: the seven counties just listed in New York City and on Long Island.

3. **Statewide**: all counties in New York State.

Step 3: Calculate Benefits

In this step, benefits are calculated for the three benefit areas. Two sample problems are provided as examples at the end of these guidelines (pp. 42-44), with results summed as annual dollar savings. If annual benefits for a specific project may change from year to year they should be calculated annually for a five-year period, as in the case of such cumulative benefits as safety-related savings. Assumptions may be necessary during benefit calculation, typically when needed data either do not exist or are extremely difficult to obtain. Resulting assumptions require good engineering judgment, and should be clearly identified as assumptions to avoid confusion when calculations are reviewed.

Step 4: Calculate Present-Worth Life-Cycle Cost

This involves converting annual benefits to a present-worth value, and requires two assumptions:

1. **Life Cycle**: TR&D bases calculations on benefits resulting during only the first five years of implementation.

2. **Interest Rate**: a 4-percent rate is used for all benefits calculations.

There are two different methods for calculating present worth, depending on type of annual benefits. The method shown on Form 2 should be used if annual benefits are *uniform* during the five-year period. The method shown on Form 3 should be used when annual benefits are *non-uniform* throughout the five-year period. Sample calculations for both uniform and non-uniform present-worth calculations are provided at the end of these guidelines.

Capital Program Benefits

Labor

Labor benefits are applicable when a study's anticipated results can reduce labor cost of a capital project. These benefits should be determined based on current wage rates and fringe-benefit percentages. It is important to remember that labor rates in New York State can vary substantially by county -- thus, one must define the area within the state to be affected by the project. The following assumptions are used for all labor-benefit calculations:

1. All labor benefits having statewide effects are calculated using statewide average labor rates.

2. Labor benefits that are regional or occur in New York City are calculated using representative labor rates for that area.

FORM 2: PRESENT-WORTH LIFE-CYCLE-COST WORKSHEET FOR UNIFORM ANNUAL BENEFITS

Benefit Area	Annual Benefit ($/year)	A/P Factor	Present Worth($)
Capital Program	_____	x 4.4518 =	_____
Operational Program	_____	x 4.4518 =	_____
Safety and Users	_____	x 4.4518 =	_____

Data: I = interest rate = 4.0%
N = life-cycle = 5 years
A/P Factor = converts annual payments to present-worth value for a given life-cycle and interest rate

$$A/P(4.0\%,5) = ([1 + I]^N) - 1/I \times (1 + I)^N$$
$$= ([1.04]^5) - 1/0.04 \times (1.04)^5$$
$$= 4.4518$$

NOTE: This form should be used only when annual benefits within each area do not change from year to year

FORM 3: PRESENT-WORTH LIFE-CYCLE-COST WORKSHEET FOR NON-UNIFORM ANNUAL BENEFITS

Benefit Area And Year	Annual Benefit ($/year)	F/P	Present Worth($)	Group Totals
CAPITAL				
1	_____	x 0.962 =	$_____	
2	_____	x 0.925 =	$_____	
3	_____	x 0.889 =	$_____	
4	_____	x 0.855 =	$_____	
5	_____	x 0.822 =	$_____	$_____
OPERATING				
1	_____	x 0.962 =	$_____	
2	_____	x 0.925 =	$_____	
3	_____	x 0.889 =	$_____	
4	_____	x 0.855 =	$_____	
5	_____	x 0.822 =	$_____	$_____
SAFETY				
1	_____	x 0.962 =	$_____	
2	_____	x 0.925 =	$_____	
3	_____	x 0.889 =	$_____	
4	_____	x 0.855 =	$_____	
5	_____	x 0.822 =	$_____	$_____
USERS				
1	_____	x 0.962 =	$_____	
2	_____	x 0.925 =	$_____	
3	_____	x 0.889 =	$_____	
4	_____	x 0.855 =	$_____	
5	_____	x 0.822 =	$_____	$_____

Data: I = interest rate = 4.0%
N = life-cycle = 5 years
Factor = converts benefits to present-worth value for a given life-cycle and interest rate

$$\text{Factor } (4.0\%, N = 1 - 5) = 1/(1 + I)^N$$

Data Sources
Statewide Averages:
1. Main Office: Design Quality Assurance Bureau or Contract Management Bureau
2. Prevailing Wage Unit: (718) 797-7731

Regional and NYC Rates:
1. Study proposals for regional projects from the Design Quality Assurance Bureau
2. New York City Controller's Unit: (212) 566-2170
3. Upstate rates: NYS Department of Labor: (518) 457-5589

Materials

Capital program benefits can result from reduction in materials quantities and/or costs, and should be based on current market values. Note that many sources of information concerning current materials costs may also provide information on associated labor costs -- for example, the Weighted Average Bid Prices published semiannually by NYSDOT, providing information on materials quantities and costs at numerous locations statewide. Not only are materials covered, but also labor and equipment. When bid prices must be converted to pure materials costs, assume that materials are one-third of total cost.

Data Sources
1. BAMS (Bid Analysis and Management System): this is a NYSDOT computer system containing the most up-to-date records for all bid prices statewide. It is designed to call up any bid price or quantity on any contract dating back to 1984.
2. Weighted Average Bid Prices: Office of Engineering, NYSDOT, available in the TR&D Library.
3. Design Quality Assurance Bureau and Contract Management Bureau

Equipment

Benefits can be achieved through reducing or improving needed equipment, with calculations based on current operating and equipment costs.

Data Sources (publications available from the Construction Division)
1. Costs Reference Guide for Construction Equipment: Dataquest, Inc., San Jose Calif.
2. Rental Rate Blue Books: Equipment Guidebook Co., Palo Alto, Calif.
3. Means Heavy Construction Cost Data: R.S. Means Co., Kingston, Mass.

Longer Service Life

Longer lives for capital-improvement projects are beneficial to the Department by reducing the need for reconstruction, redesign, and related operations. (No data sources are suggested, because service life is highly specific to a given project, material, or process, but references previously listed here may be helpful.)

Contract Duration

Reduction of contract duration and contract-time overruns provide significant monetary benefits for the Department's capital program, especially when lane-closure, lane-rental, and contract-completion-incentive clauses are included in a contract. (When contract-duration savings are a potential benefit for a project, the Construction Division should be consulted; other data sources listed here may also be pertinent in calculating this benefit.)

Operating Program Benefits

Maintenance

This is a major part of the Department's operating program, and may be identified as having four separate areas for purposes of identifying benefits: 1) frequency, 2) equipment, 3) labor, and 4) materials. Monetary benefits to the operating program may result from savings in any or all of these four separate areas. Less frequent maintenance provides savings to the operating program by allowing workers to conduct more maintenance activities in a given year. Reductions in maintenance equipment, labor, and materials needed to complete a given task also represent monetary benefits for the program. Increases in any of these items must be considered when calculating net benefits. Benefits in maintenance practices should be calculated using maintenance-cost figures provided by the Transportation Maintenance Division. Because most maintenance activities are conducted by Department forces, it may be inappropriate to use contract bid prices for benefit calculations, except where the Department has contracted for maintenance work.

Data Sources
1. For Department-conducted maintenance: Transportation Maintenance Division (main office and regions)
2. For contract maintenance: Weighted Average Bid Prices, Office of Engineering
3. BAMS (Bid Analysis and Management System)
4. Bridge Inventory System
5. Means Heavy Construction Cost Data, R.S. Means Co., Kingston, Mass.
6. Rental Rate Blue Books: Equipment Guidebook Co., Palo Alto, Calif.
7. Equipment Management Division

Design Procedures

Savings to the operating program can be calculated in terms of cost-effectiveness of the Department's design procedures, including anything from improved design methodologies to improved computer-aided-design packages.

Data Sources (NYSDOT Main Office)
1. Structures Design and Construction Division
2. Design Division (Main Office)
3. Engineering Automation Resource Support Group (Main Office)

Safety Benefits

Accident Frequency

Reduction in accident frequency results in significant savings for the Department. Among the benefits are less maintenance of damaged roadway facilities, fewer injuries and fatalities, and improved road operating characteristics. Although many sources exist for accident data and statistics, information from the New York State Department of Motor Vehicles (NYSDMV) and NYSDOT's Transportation Planning, Highway Safety, and Traffic Engineering Division (TPHSTE) should be used in calculating benefits accruing from reduced accident frequency. (Other sources can be helpful in some instances, but may not reflect typical New York State conditions.)

The TPHSTE Division continuously develops figures for accident-reduction percentages based on road improvements. They also have worksheets specifically designed for safety-related benefit calculations that provide an organized, acceptable means for calculating these benefits.

Data Sources
1. Annual Accident Summaries, NYSDMV.
2. Long, G.H., and Watson, J.E. Highway Safety Improvement Program: Procedures and Techniques, NYSDOT Traffic Engineering and Safety Division, November 1989.
3. Accident Facts (published annually), National Safety Council

Accident Severity

Reduction of accident severity is another safety benefit for the Department, particularly in cases of liability against the state. By reducing severity, risk of personal injury is diminished as well as likelihood of legal action. Numerous sources exist for accident information, but statistics developed by NYSDMV and NYSDOT's TPHSTE Division are the most useful.

Data Sources
1. Annual Accident Summaries, NYS Department of Motor Vehicles
2. Long, G.H., and Watson, J.E. Highway Safety Improvement Program: Procedures and Techniques, NYSDOT Traffic Engineering and Safety Division, November 1989.
3. Accident Facts (published annually), National Safety Council.

User Benefits

Travel Time

These are benefits to system users, rather than monetary benefits to the Department. An interesting characteristic of user benefits is their magnitude compared to other benefits. Because user benefits affect the entire user public, they generally result in very high dollar values. Benefits affecting travel time and travel distance are very similar and often identical. Both depend on monetary values placed on the user's time, but this by itself is controversial because users generally value their time very specifically. Many past studies to develop personal dollar values have themselves differed substantially. Travel-time savings affect three major groups: commercial-vehicle operators, business travelers, and recreational travelers. Particular assumptions are specific to each type of travel-time benefit:

1. **Commercial-Vehicle Operators:** they often assume that any time-saving can be translated into additional output by the crew and perhaps the vehicle. These should be evaluated with caution, because it is often difficult (if not impossible) to reassign vehicles and crews to other operations.

2. **Business-Travel Time:** assumptions for business-travel time are similar to those for commercial operations, with these additional complications: 1) considerable business travel occurs during the road user's personal time and savings thus are not necessarily translated into extra output or work, and 2) people often work while traveling, so that their travel time is not always truly "lost" time.

3. **Recreational-Travel Time:** these values are expressed as a proportion of average-hourly-wage rate on the assumption that willingness to pay for time savings is related to income measured by wage rate. The following table, prepared by the Institute of Transportation Engineers, lists recommended values for time in the United States, and should be used for all travel-time calculations:

Data Sources
1. Transportation Planning Handbook, Institute of Transportation Engineers, 1992.
2. A Manual of User Benefit Analysis of Highway and Bus Transit Improvements, AASHTO, 1977.

Person-Time (Person-Hours)	In-Vehicle Time ($/Person-Hour)	Waiting/Walking Time* ($/Person-Hour)
Low Time Savings (0-5 Min)		
Average Trips	0.21	5.85-7.80
Work Trips	0.48	5.85-7.80
Medium Time Savings (5-15 Min)		
Average Trips	1.80	5.85-7.80
Work Trips	2.40	5.85-7.80
High Time Savings (over 15 Min)		
Average Trips	3.90	---------
Work Trips	3.90	---------
Commercial Vehicles		
		Overall
Single Unit Truck (SUT)		7.00
3 - S2 Design Vehicle		8.00

*Depends on out-of-vehicle comfort and safety

Vehicle-Operating/Maintenance Cost

Improvements of road conditions or road-design policies may affect vehicle maintenance and operating costs. Again, these savings might seem fairly trivial, but can be substantial when the entire user public is considered. Savings in vehicle operating/maintenance costs producing monetary benefits for the user generally include 1) fuel consumption, 2) lubricants, 3) vehicle maintenance (labor, parts), 4) capital consumption (depreciation), 5) interest on capital employed, 6) wages, and 7) overhead.

Data Sources

1. Transportation Planning Handbook, Institute of Transportation Engineers, 1992.
2. A Manual on User Benefit Analysis of Highway and Bus Transit Improvements, AASHTO, 1977.
3. Zaniewski, J.P., Butler, B.C., Cunningham, G., Elkins, G.E., and Paggi, M.S. Vehicle Operating Cost, Fuel Consumption, and Pavement Type and Condition Factors. Report FHWA/PL-82/001, Texas Research and Development Foundation (Austin), March 1982.
4. The Highway Design and Maintenance Standards Model. Baltimore: Published for the World Bank by the Johns Hopkins University Press, 1987.

SAMPLE PROBLEM 1

STEP 1 1. Title: Open-Graded Asphalt Friction Courses (OFA)

2. Description: Calculate benefits to the Department from using OFA to correct wet-weather-related high-accident locations. Calculations should assume that the Department will continue using OFA at a rate equal to past years.

3. Identify Benefit Classification: Referring to Form 1, it is apparent that no benefits can be accumulated for capital, operations, or users, because compared to normal high-friction top-course asphalt OFA is similar in design life, relatively equal in cost, and requires no additional maintenance. Benefits of using this material fall into the safety classification for accident reduction. The intent in its use is to improve pavement-surface drainage and thus to reduce wet-weather accidents.

STEP 2 Statewide target area

STEP 3 1. Department use of OFA

BAMS was searched to locate OFA tonnage used dating back two fiscal years:

Year 1: 7571 tons
Year 2: 8090 tons

Additional information: OFA density is 142 pcf, typical OFA overlay is 1.25-in. thick

Tons/mile assuming a 12-ft lane:
(142 pcf) (1 ton/200 ft) [(0.104' x 24' x 5280')/mile] = 927.2 tons/mile

Year 1 mileage = (7571 tons) (1/937.2 tons/mile) = 8.08 miles
Year 2 mileage = (8090 tons) (1/937.2 tons/mile) = 8.63 miles

Assume the Department will use 8 miles of OFA annually on highways carrying at least 5000 vehicles daily

2. 100 million vehicle-miles (100 MVM)
= [(8.0 miles) (5000 vehicles/day) (365 days/year)]/1 million = 0.146

3. Accident (acc) Rates and Percentages (from DMV summary for Year 1)

Statewide: 2.05 fatalities/100 MVM, 297.67 personal injuries (PI)/100 MVM
40.9% of statewide accidents are rural
23.6% of rural accidents are wet-weather-related

4. Composite Accident Rates (rural wet-weather)

Fatal: (2.05) (0.409) (0.236) = 0.198 acc/100 MVM
PI: (297.67) (0.409) (0.236) = 28.7 acc/100 MVM

5. Accident Costs (from TRB publications)

Fatal: $1,086,147/acc
PI: $13,000/acc

6. Number of accidents on typical 0.8-mile rural segment

   Fatal: (0.146 100 MVM) (0.198 acc/100 MVM) = 0.03 fatal/yr
   PI: (0.146 100 MVM) (28.7 acc/100 MVM) = 4.20 PI/yr

7. No-Action Accident Costs

   Fatal: (0.03 acc/yr) ($1,086,147/acc) = $32,548/yr
   PI: (4.20 acc/yr) ($13,090/acc) = $54,978/yr
   Total = $87,562/yr

8. Accident Costs after OFA Overlay

   59% reduction in wet-weather accidents with OFA (from TPHSTE Division)
   Fatal: (0.03 acc/yr) (0.41) = 0.0123 acc with OFA
   PI: (4.20 acc/yr) (0.41) = 1.7 acc with OFA

9. Corrected Accident Costs with OFA

   Fatal: (0.0123 acc/yr) ($1,086,147/acc) = $13,360/yr
   PI: (1.7 acc/yr) (13,090/acc) = $22,253/yr
   Total = $35,613/yr

10. Annual Savings (because savings are cumulative, Years 2, 3, 4, and 5 savings will be respectively two, three, four, and five times the Year 1 value):

    Year 1 Annual Savings = (acc cost without OFA) - (acc cost with OFA)
    = ($87,562) - ($35,613) = $51,949
    Year 2 Annual Savings = $103,898
    Year 3 Annual Savings = $155,847
    Year 4 Annual Savings = $207,796
    Year 5 Annual Savings = $259,745

STEP 4 1. Use Form 3 to convert to 5-yr present-worth life-cycle cost, because annual benefits differ:

   RESULTING BENEFITS = $675,805

SAMPLE PROBLEM 2

STEP 1 1. Title: Corrugated-Metal Box-Culverts (CMBC)

2. Description: Calculate potential benefits from using CMBCs (at least 22-ft width) instead of current precast-concrete box-culverts. Assume Department will continue using box-culverts at a rate equal to current use. This benefit analysis can be classified as "capital" based on Form 1.

STEP 2 Statewide target area

STEP 3 1. Assumptions:

1/3 of bid price represents materials
For CMBC, no costs are available for labor and equipment; although probably less than for precast concrete, they are assumed equal
4% interest rate
5-year life cycle
Design lives are equal

2. From BAMS and Weighted Average Bid Price book:

Two box-culvert items used in previous years (representative of previous annual use)

Item 1 (22' x 8')	Item 2 (22' x 8')
Avg bid price: $1600/lf	Avg bid price: $1719/lf
Amount placed: 57 lf	Amount placed: 40 lf

3. Calculate weighted avg bid price

[(57 lf) ($1600/lf) + (40 lf) ($1719/lf)]/97 lf = $1650/lf

4. Corrected weighted bid price for labor

= ($1650/lf) (1/3) = $550/lf for precast concrete

5. Department's annual materials cost

= ($550/lf) (97 lf) = $53,350/yr

6. From Corrugated Metal Box Culvert Mfg Co:

Approx materials cost = $330/lf

7. Potential Department cost using CMBC

= ($330/lf) (97 lf) = $32,010/yr

8. Annual savings: precast cost - CMBC cost
= $53,350 - $32,010 = $21,340/yr

STEP 4 Using Form 2, because annual benefits are the same:

RESULTING BENEFITS = $97,730

APPENDIX C
PROJECT ACTIVITY CODES AND PROJECT IDENTIFICATION NUMBERS (PINS)

Activity codes and PINs are used on timesheets, expense accounts, and vouchers to track Bureau activities and account for costs attributable to specific projects, providing for both effective monitoring of project costs and schedules and for efficient computation of Bureau performance measures.

Activity Codes

These are two-part codes identifying specific activities and the section completing them. The first three characters identify the Bureau organization for which the work is done, and the next four the specific activity. Generally, these "activities" apply to the following five major areas of effort:

1. Program formulation.
2. Research projects.
3. Engineering and technical support.
4. Technical assistance and technology transfer.
5. Administrative support.

Listings and descriptions of currently approved organization and function codes are maintained and available from the Administration staff. For work not fitting any of these approved codes, consult the Administration staff for guidance.

Project Identification Numbers (PINs)

The following steps are used by TR&D when assigning project identification numbers or PINs, used on accounting documents (e.g., timesheets, travel vouchers, equipment requisitions) to collect all charges attributable to specific projects:

1. Investigator provides Administrative Assistant with completed Project Description Form (Fig. 7) and requests PIN assignment.
2. Administrative Assistant assigns PIN, completes FIN 207-4c (Fig. 8), and sends it to Accounting.
3. Administrative Assistant enters new PIN into TR&D Project Status Report system and updates both project funding summaries and project listing.

Figure 7. Form for initiation of a new project.

New York State Department of Transportation
Transportation Research and Development Bureau

PIN: R_____

INITIATION OF NEW PROJECTS

PROJECT:

MANAGER:

PROBLEM:

OBJECTIVE:

BENEFITS:

SIX-MONTH PLAN:

STATUS:

TOTAL COST: EQUIPMENT:

EST'D 1997 COST: EQUIPMENT:

CLIENT:

PROJECT
COMPLETION DATE:

SECTION HEAD
APPROVAL: _____

DIRECTOR APPROVAL: _____

Figure 8. Form requesting permission to charge expenses to a new project (FIN 207-4c).

TO:
☐ REGION
☐ MAIN OFFICE
☐ _____

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION

MISCELLANEOUS PROJECT AUTHORIZATION

TRANSACTION CODE ☐ 1 NEW ☐ 2 REVISION ☐ 3 DELETION
COL. 79

You are hereby authorized and directed to _____ work on the phase indicated as of the date shown. No other work is authorized at this time.

PROJECT DESCRIPTION: _____

Is this project reimbursable? ☐ YES ☐ NO Source of reimbursement _____

PROJECT IDENT. NO.	
MAJOR 1–6	SUB 7–9

REMARKS:

10–13	14–17	18–21	22–25	26–29	30–33

Authorized Signature	Date

ORIGINAL RECORD DATE 34–39	PROJECT COST 40–45	PROJECT TYPE 46–66	WORK TYPE 72	FUNCT CLASS 74	URBAN AREA 76–78	79 80
						1

C 10	ROUTE NO. 12–15	TERMINI OR DESCRIPTION (SOUTH OR WEST TO NORTH OR EAST) LIMIT 53 SPACES 16–68	79 80
			2

FEDERAL PROJECT NUMBER 10 12 13–16 17–19	FHWA AUTH. DATE 20–25	FHWA% 26–30	PROG. 31–33	LENGTH 34–37	COMPTROLLERS CONTRACT NUMBER 38–44	SYSTEM F 45	SYSTEM S 46	C/A 47	C B 49	F I 50	SUP. PRESS 51	BOND FUND CODE 53–55	79 80
													3

COUNTY ONE				COUNTY TWO				COUNTY THREE				COUNTY FOUR					
CO 10	C	S/R COST 13–17	FIPS CODE 18–22	CO 23	C	S/R COST 26–30	FIPS CODE 31–35	CO 36	C	S/R COST 39–43	FIPS CODE 44–48	CO 49	C	S/R COST 52–56	FIPS CODE 57–61		79 80
																	4

FIN 207-4c (7/81)

Figure 9. Form recording change in project scope, investigator, funding, or schedule.

TRANSPORTATION RESEARCH AND DEVELOPMENT BUREAU
NEW YORK STATE DEPARTMENT OF TRANSPORTATION

RESEARCH PROJECT MODIFICATION REQUEST

RESEARCH PROJECT NO. _____

TITLE _____

DATE _____

I. ☐ NOTIFICATION OF CHANGE IN PRINCIPAL INVESTIGATOR

FROM _____

TO _____

EFFECTIVE DATE _____

II. ☐ FHWA APPROVAL REQUESTED FOR THE FOLLOWING MODIFICATIONS

A. ☐ FUNDING:

ESTIMATED PROJECT COSTS:
___INCREASE ___DECREASE
CURRENTLY APPROVED HPR-0010 ( ): _____
REQUESTED REVISION HPR-0010 ( ): _____
___INCREASE ___DECREASE ___NO CHANGE
ORIGINAL APPROVED TOTAL PROJECT COST: _____
CURRENTLY APPROVED TOTAL PROJECT COST: _____
REQUESTED REVISION OF TOTAL PROJECT COST: _____

JUSTIFICATION FOR MODIFICATION: _____
_____
_____
_____
_____
_____
_____

B. ☐ TIME:

FOR PROJECT COMPLETION (PUBLISHING OF FINAL REPORT)
PROJECT INITIATION DATE: _____
CURRENTLY APPROVED COMPLETION DATE: _____
REQUESTED REVISION OF COMPLETION DATE: _____
REVISION NUMBER: _____

JUSTIFICATION FOR MODIFICATION: _____
_____
_____
_____
_____
_____
_____

4. Once a PIN is established, a folder is prepared for the Bureau's active files. The Investigator must notify the Administrative Assistant of any changes of project scope, cost, or completion date by completing a "Research Project Modification Request" (Fig. 9).

5. The Investigator must notify Administrative Assistant to terminate the PIN when the project is completed or discontinued, so no additional charges will be assessed to the PIN's account.

Six general PIN categories are used for Bureau work, including those assigned to formal research projects:

R010XX.881: used for federal-aid activities involving general program administration.

R011XX.881: used for federal-aid activities covering information exchange, technology transfer, and library services.

R012XX.881: used for all engineering consultation efforts eligible for federal reimbursement (modest efforts -- estimated as costing less than $10,000 -- may be charged to R01200.881 without pre-approval by FHWA; those costing significantly more than $10,000 require both FHWA approval and a separate PIN).

R013XX.881: used for all implementation activities eligible for federal aid.. Modest efforts (estimated as less than $10,000) may be charged to R01300.881 without FHWA approval, but those costing more must have both FHWA approval and a separate PIN.

R016XX.881: used for all training activity eligible for federal aid.

RXXXXX.881: used for all formal projects eligible for federal aid, each having its own separate PIN.

Other PINs may be established for work on projects in categories not listed here, including those ineligible for federal aid. Consult Administration staff for assistance. Other NYSDOT agencies or regions assisting the Bureau on projects may be approved to charge work to PINs, and must be notified in writing by the appropriate section head of proper PIN number and function code for the specific task to ensure accurate documentation of all costs incurred.

APPENDIX D
GUIDE FOR PREPARING STUDY PROPOSALS/WORK PLANS

Study Proposal Content

In the 1960s, FHWA called the document initiating a project a"Work Plan," but in the 1970's changed its title to "Study Proposal," which in turn must include as Item 7 a section also called a "Work Plan" as described here -- this understandably has led to occasional confusion. A research study proposal, in any event, should be a well-thought-out document establishing the need for a research investigation; clearly defining the objective(s), providing a detailed work plan for achieving the objective(s), and indicating how the findings are to be used. The following outline is based on FHWA guidelines for preparing study proposals. The first 11 items are required for a Type A study (requiring two years or more and having a budget greater than $75,000). Items 9 and 10 may be omitted for Type B studies (lesser duration and budget). Item 12 summarizes the appendices that now must be added to all New York State study proposals.

1. Identification

List the concise title; client organization name and address; principal investigator's name, title, and address (including zip code and mail code); and lead research organization name, and address.

2. Problem Statement

Clearly and concisely describe the problem to be studied in the proposed research.

3. Objectives

Indicate the technical objectives on which research staff attention is to focus and efforts are to converge. In other words, what specifically is this study to accomplish?

4. Background and Significance of Work

Describe findings of the TRIS search or other literature searches, and indicate why the proposed work is potentially significant as compared to other related research efforts.

5. Benefits

State the benefits anticipated from the research findings, particularly in terms of return on investment. Measures may be expressed as improved procedures, increased efficiency or effectiveness, operational improvements, greater safety, dollars saved, or materials conserved.

6. Implementation

Provide such information as whether expected research findings can be readily adapted by the intended user. If not, will further work be needed to develop or field-test the findings or product? Will findings be presented as a proposed specification, procedural manual or guide, hardware for demonstration, etc.?

7. Work Plan

Fully describe the approach intended and specify how the study will be structured to meet each objective. Identify major operational phases and relate them to staff requirements, time schedules, and cost estimates. Also provide information covering such important aspects as sampling plans, tests to be used, number(s) of test sections, statistical analysis methods, use of existing models or development of new ones, expected survey techniques, criteria to be used to judge acceptability, etc.

8. Budget Estimate

Provide a summary tabulation showing staffing plan, estimated person-hours, and total estimated costs broken down by fiscal year and study phase. Include salaries, overhead, and indirect costs; computer time; equipment (purchase and/or rental); expendable materials and supplies; publishing costs; and special services (where applicable). Where financing includes more than SPR and matching Departmental funds, a supplementary tabulation should show total cost by source of funds.

9. Facilities Available

Describe those available to investigators for use in the study.

10. Work-Time Schedule

Provide a bar chart, or other type of progress chart, to illustrate the interrelationship and scheduling of major study phases.

11. Reports

Describe those to be prepared documenting the work and fulfilling study objectives.

12. Appendices

Researchers preparing study proposals in 1997 and thereafter must add the following appendices:

a. Data Management

Procedures to archive project data, as outlined in Appendix G of this Manual, must be summarized briefly in an appendix, especially if they present unusual conditions or procedures.

b. Peer Review

Study Proposals undergo peer review both internally (within NYSDOT) and externally (the latter according to procedures described in Appendix J of this Manual). Comments of external peer reviewers must be summarized or reprinted in full.

c. Project Initiation Documentation

This includes the original request or suggestion to initiate the project (Form PHR-110a or the form "Initiation of New Projects" available as g:\share\shells\projinit.frm), any response from the client to this request or suggestion, a researcher's evaluation of the request or suggestion (if available), and a list of the project's clients and other contact persons

d. Biographies of Principal Investigators

Concise resumes giving appropriate professional backgrounds of investigators.

Policy on Study Proposal Development and Content

Problem Definition and Formulation

The process of asking clients and research staff the who, what, where, why, and how questions so that all aspects of the proposed research activity are understood, resulting in a written statement defining the following points: 1) the specific issue to be addressed (i.e., a clear, concise statement of the problem), 2) a list of specific objectives whose attainment will result in solving the research problem -- each should be defined so that its attainment is measurable, 3) the form of the delivered product, and 4) the product's needed delivery data. To start a viable research project, participants must clearly agree as to what the problem is, what form its solution must take, and when the solution must be delivered for effective use.

Feasibility Study

A comprehensive review of the problem and needed research to produce the following: 1) an outline of experimental design and estimated product cost, 2) a description of envisioned benefits, 3) an estimate of cost improvements, 4) a description of requirements for implementation, 5) a cost estimate of implementing any required changes to Department practice or operations, 6) an estimate of the probability of meeting the required delivery date and possible controlling factors, 7) an estimate of the probability of technical success and a description of any factors influencing success, and 8) an estimate of the probability of successful implementation and description of the controlling factors. The output will be a written report addressing these eight points and a recommendation as to whether this problem should be considered a candidate for the research program. A negative recommendation may result in further refinement of the problem definition and a new feasibility study.

Literature Search

To conserve Departmental resources, every effort must be made to discover whether the problem has already been solved elsewhere, or others are working on a solution.

Experimental Design

This includes all activities leading to production of a document (work plan, study proposal) describing the research project. This should contain detailed information concerning project schedule, budget, design, a summary of the feasibility study, and a listing of significant references consulted during the document's preparation. The project budget should summarize costs related to delivering the product by task and resource for each month of the project's life. In addition, data and costs for major equipment purchases or contract commitments affecting the schedule should be noted for projects involving development of software, acquisition of computer hardware, or development of automated systems. The major emphasis in research design should be on describing the engineering questions being addressed by the project, the data needed to answer the questions posed, the statistical engineering model describing how the data analysis will be conducted, a discussion of how the model is related to these engineering questions, evaluation criteria by which the statistical engineering model will be judged, and the manner and timing of the data-collection effort.

Budget Policy and Procedures

TR&D Project Budget Policy

Sections heads and principal investigators are responsible for ensuring that project budgets are prepared in a consistent manner. Such costs as travel, supplies, minor contractual services, and equipment should not normally be included in a research-project budget. These costs account for only about 5 percent of most project budgets, and the expense associated with determining and processing such minor costs is not warranted. Project budgets for work performed by consultants, universities, and other research agencies will be based on their budget estimates, and will include Department personal service costs for necessary management and supervision. Such budgets may include costs for travel, supplies, minor contractual services, equipment, etc. Because of administrative costs associated with acquiring equipment under a contract, any purchased by the contractor to complete required research will normally remain property of the contractor with costs computed accordingly. When a project budget contains an item, such as an expensive piece of equipment, that cannot be purchased within the normal Bureau budget, the work plan should be submitted as a budget enrichment before starting any project work. This requirement generally implies a 1- to 2-year lead time.

TR&D Project Budget Procedures for Department (In-House) Projects

Study proposal development costs should be included in the project budget. When actual costs exceed those estimated, the budget should be adjusted to reflect this increase. The budget should have three tables: 1) function versus project duration, 2) skill levels versus project duration, and 3) function versus skill levels. All entries should be in whole pay periods. The principal investigator should check with the Section head to ensure that necessary pay periods for the skill levels required will be readily available over the project's entire duration. Emphasis on developing these tables will ensure that the project plan is internally consistent, makes good use of all Bureau personnel, and avoids future over-programming of Bureau resources. Development of the work-plan cost estimate should follow this outline in abbreviated form. Project costs should be shown by year, function, and skill level, after adjusting for estimated salary increases. All salary adjustment factors must be shown. Possible obstacles to achieving the stated project schedule should be listed, along with matching contingency plan(s) to maintain the project schedule. If no contingency plan appears viable, state the estimated impact on the schedule. Development of the project budget should include consideration of the following functions:

Study Proposal

1. Problem Definition and Formulation
2. Feasibility Study
3. Literature Search(es)
4. Experimental Design

Function Codes (see Administrative Assistant for full list)

1. Meetings and Conferences
2. Training
3. Equipment Design, Construction, and Maintenance
4. Data Collection
5. Data Analysis
6. Report Preparation
7. Report Production
8. Implementation
9. Consultant Agreements

APPENDIX E
PROCEDURES FOR TR&D PUBLICATIONS AND CORRESPONDENCE

Transportation R&D Publications Series

TR&D publishes 1) reports in three series (Research Reports, Special Reports, and Client Reports), 2) Study Proposals, and 3) newsletters (Transportation R&D News and TNT: Technology News Transfer). We also prepare preprints of papers to be presented at meetings sponsored by TRB and other professional societies, and final drafts for their publication.

Research Reports (cover color: light tan)

This is our principal series, usually presenting findings at the conclusion of major federally funded SPR research projects as "final reports," normally published in press runs of 150 to 250 copies, of which 24 go to FHWA (including several for the US Department of Commerce National Technical Information Service, which sells them in paper and microform), 30 to the NYS Library Gifts and Exchange Division (which collects all NYS publications for distribution to other libraries throughout the state). Preliminary drafts of reports are reviewed and approved by the Bureau Director and NYSDOT in-house clients before publication.

Special Reports (cover color: yellow)

These are shorter reports, on topics of more limited interest or timeliness, including interim reports on major SPR projects or simple closeouts of minor research projects. Normally published in press runs of 150 to 250 copies, they are also reviewed and approved by the Bureau Director and NYSDOT clients before publication.

Client Reports (cover color: light green)

These present information to specific NYSDOT in-house clients in a more permanent form than memos, often not related to federally funded SPR projects, and generally distributed primarily to the client (they are thus sometimes semi-confidential). They are normally published in press runs of 50 to 100 copies.

Study Proposals (cover color: light blue)

These are requests to FHWA for SPR funding, prepared according to a format specified by FHWA, including work-time schedules and budget/personnel information. They are normally published in press runs of 50 copies or less.

Transportation R&D News (canary)

Published quarterly in press runs of 1500, to announce new TR&D publications (a light-blue order form is included in each issue) and new research studies (awaiting approval by FHWA or just approved by them), often also including a feature article, sent to a mailing list maintained by the Administration Section, about evenly divided between readers inside and outside NYSDOT. Subject matter is usually restricted to our Bureau and our programs.

TNT (Technology News Transfer) (light blue)

Published quarterly in press runs of 2500, distributed only within NYSDOT to all persons with engineering and technician titles (Technology Transfer staff has responsibility for the mailing list and collects the news items). Copy for this newsletter comes primarily from the Technical Services Division, but may also be collected elsewhere in the Office of Engineering or other Department agencies.

The Editor handles all liaison with Graphic Arts, including all requisitions for printing, large-run quick-copy work, art work, photography, etc. All work performed by Graphic Arts personnel must have requisitions prepared by the Editor, and "job numbers" assigned by the Graphic Arts Control staff. The original "mechanicals" (final paste-up pages, camera-ready for reproduction) and all art work, photo prints and/or negatives, metal plates, etc., for all publications are kept on hand by the Editor for reprints as needed.

Standards for Preliminary Drafts of TR&D Publications

Authors are expected to be familiar with the formats of our own recent publications as examples of normal format and style. Research publications must conform to requirements of the Federal Highway Administration, U.S. Department of Transportation, for documents they have funded; the Editor is responsible for conformance with those requirements. Style in our publications (punctuation, spelling, abbreviations, etc.) is based *primarily* on the American Heritage dictionaries and the University of Chicago Style Manual (14th ed., 1994), the foremost standard for technical and academic publications in this country, and *secondarily* on the publications of the premier national publishers in our field -- the Transportation Research Board of the National Research Council (and their style manual), and the Council's National Cooperative Research Programs. Publications of the American Society for Testing and Materials and the American Society of Civil Engineers (including their journals and magazines) also contain useful professionally edited examples of acceptable technical presentation. When preparing any manuscripts for publication by those organizations (TRB, NCHRP, ASTM, ASCE), writers must use their current instructions for authors and their style sheets, style manuals, or other instructions for authors.

Text

1. Type all text in Wordperfect 6.1, Times Roman font, 12-point, double-spaced, with 1-in. margins on all sides.

2. Number text pages consecutively with arabic numbers. The title page, abstract page, and contents page are called "preliminaries" and are not numbered. The abstract is a single paragraph not exceeding 250 words in length. The contents page should list all first- and second-level headings from the text (see next item). Headings for the title page, abstract, and contents page (and also for the "Acknowledgments" and "References" pages that follow the text) should each begin 2.5" down from the top of the page. Each chapter also begins 2.5" down from the top of the page, but continuation pages completing each chapter begin 1.5" down from the top of the page.

3. Use outline format and headings throughout the text, assigning numerals or letters to each text section:

Example: I. FIRST-LEVEL HEAD (Roman numeral, all caps, centered, no underline). Each first-level head begins 2.5" down on a new page.

A. Second-Level Head (Capital letter, initial caps only, centered, underlined).

2. Third-Level Head (Arabic numeral, initial caps only, underlined, flush with left margin)

As in any outline, there must be two or more headings at each level: I must eventually be followed by II, A by B, 1 by 2, etc. Within each chapter, triple-space before each new second- or third-level heading, and double-space after it.

4. No numbered tables or figures may be displayed on text pages -- each table and figure should be displayed on its own separate page. Each figure and table must be mentioned in text by a consecutive arabic number, and should be inserted in the draft following the text page on which it is first mentioned. (Occasionally small tables, too short or brief to need titles or numbers, which are essentially portions of the sentences that precede and present them, may be displayed within the text.)

5. The text is followed by an "Acknowledgments" page and "References" page (or pages). References are listed in the order cited in text (not alphabetically or chronologically) -- for style (punctuation, abbreviations, underlining, etc.) see recent publications of this Bureau. Appendices (identified by capital letters, not numbers) follow the acknowledgments and references, and may contain tables and figures which are numbered using arabic numerals following and continuing in sequence from the main text (do not use letter prefixes for these numbers). Page numbering also continues from the main text.

Listings

Within text paragraphs, it is sometimes desirable to separate each item in a series in a visual display for maximum clarity -- for example, a list of numbered conclusions. (Sometimes, a listing also ranks these items in order of importance.) These items can be numbered (in arabic numbers) or preceded by individual bullets. The number or bullet is indented four spaces from the left margin, and each continuation line within a numbered listing paragraph is indented eight spaces:

1. This is the first item in a listing; note that there are two spaces after the number and period, before the first word of this sentence, and that the second line is indented under the capital T of the word "This."

2. This is the second item in the listing.

3. This is the third item in the listing.

Tables (see any of our recent publications for acceptable formats)

1. Each table must be displayed on its own page, and numbered consecutively in arabic numerals. Tables do not need page numbers.

2. Tables should also be typed in Wordperfect 6.1, in 12-point or 10-point Times Roman). For tables, USE QUATTROPRO, NOT FREE-LANCE.

3. Each table must be titled (initial cap for only the first word) flush left at the top (above the body of the table), and continuation pages (if any) should be indicated as follows: Table 6 (cont.)

4. Use the same font and type sizes in ALL tables for each publication.

Figures

1. All graphs, diagrams, photos, maps, or other illustrations are figures.

2. Each figure must be displayed on its own page and numbered consecutively in arabic numerals in the same manner as tables. Figures do not need page numbers.

3. Each figure must be captioned (initial cap for only the first word) flush left at its top (above the image).

4. Use the same font and type sizes in ALL figures for each publication.

Authorship

Listing of authors on the cover and title page of a document reflects both principal and secondary roles -- 1) preparing and writing the manuscript, and 2) involvement in planning, conducting, and completing the study or investigation being reported. Listing should reflect not the seniority or rank of the persons listed, but rather their relative responsibility for the product -- principal investigator and/or writer first, then others in order of their contributions and participation in planning, data collection, data analysis, and actual writing and organizing of the manuscript. The amount, importance, and originality of individual contributions must all be considered when listing authors. Questions occasionally arise concerning these credits, and should be resolved case-by-case by the Bureau Director, when brought to his attention.

Copyright

All documents published by this Department are in the public domain, and are not subject to copyright protection. Thus, there is no individual copyright by any author(s). Authors are responsible, however, for clearances and written permissions whenever they quote or paraphrase language, or reproduce graphic or tabular materials published under copyright earlier by others. TRB publications and their "Instructions for Authors" pamphlet advise on these questions simply and clearly, or guidance may be obtained from the Editor.

Procedures for Final Drafts of TR&D Publications

To eliminate problems associated with conflicting, multiple, undated draft copies of reports, newsletters, or technical papers/preprints (for publication by others, such as TRB, ASCE, etc.) the following procedures will be followed. All manuscripts after final approval for content by supervisors and peer reviewers (and clients, when appropriate) are to be sent to the Secretary through g:share; the Secretary and author then may still revise, but all others are restricted to "read only." The Secretary will create separate directories for reports, newsletters, and preprints. Subdirectories will be created for Bureau Sections (Materials/Pavements, Structures, T^2). Thus the latest, most-current copy (as indicated by last date of revision) will reside with the Secretary:

g:\share\reports\section

The Secretary will create and retain a disk copy of the final document; this g-share final document can then be combined with other project files and archived when the project has been completed. This procedure assumes that the author sends the draft to the Secretary through g-share (or disk), and gives the Editor a paper copy for review. The author, however, may choose to work directly with the Editor on paper copy through to the final draft form -- in that case, the author is responsible for sending the Secretary the final g-share copy. The final draft in page-proof form must be approved by the author and the Director before publication. The author is also responsible for compiling a specific distribution list for each publication. The Editor supplies the Secretary a disk containing final copy for newsletters and other significant material.

Correspondence

1. All outgoing letters are prepared for the Director's signature using the currently approved letterhead shell found in g:share\shells\letter.shl.

2. Letters of a routine nature prepared for the Director's signature may be signed by a Section Head, using the Section Head's signature and writing "for" before the Director's name.

3. Letters forwarded for the Director's signature must be initialed by the Section Head who originates the item. When responding to incoming mail, a copy of that correspondence must be attached.

4. Memos directed within the Department or to FHWA are prepared for the Director's signature using the currently approved memo shell found in g:share\shells\memo.shl. Routine correspondence may be signed by the Section Head, writing "for" before the Director's name.

5. In event of his absence, the Director provides signature authority to a staff member.

6. A copy of outgoing correspondence will be returned to the author. If the author wants a copy of an attachment, inform the Secretary.

7. Should further guidance be needed, see the Secretary for more detailed formatting procedures.

Table 2. Project Manager's checklist for contract development and scope-of-services.

1. Clearly define what you expect from the contractor:
   - Define objectives
   - Define problems to be addressed
   - Define product expected
2. Discuss with prospective contractor how project problems, objectives, and products can best be defined.
3. Define problems, objectives, and products in writing; include the written definition in the formal agreement.
4. Clearly communicate to the contractor that you want a workable implementation process as part of the completed project, if applicable.
5. Develop, in cooperation with the contractor, a detailed work plan:
   - Include tasks, milestones, completion dates, interim reporting schedule, and meeting times with staff.
   - Include work schedule in the formal agreement.
6. Indicate to contractor what pertinent information is available from/or will be prepared by the Department.
7. Show the contractor where pertinent information is located, how it can be accessed, and who should be contacted when information is needed.

APPENDIX F
GUIDELINES FOR CONTRACT RESEARCH PROJECT MANAGERS

Overview of Program Management

Pre-Contract Phase

The contract-research-program involves a variety of transportation research fields including infrastructure, environment, planning, policy, intermodal transportation systems, innovative technology, administration, and productivity. The program's goal is to conduct research in these fields leading to products or to bodies of knowledge, information, or technology that are useful to the Department and can be integrated into its programs. Project managers are responsible for ensuring achievement of these goals. The manager serves as primary Department contact with the contractor and the principal investigator. The manager relays the Department's vision and study objectives to the contractor, advises on project specifics, clarifies any ambiguities, reviews progress reports, evaluates the final report, and (when applicable) implements findings or recommendations.

When a project is approved by the Research Executive Board for inclusion in the contract-research program, a Department project manager is also designated. The manager's first assignment, carried out in collaboration with the Transportation R&D Bureau and the Contract Management Bureau, is to form Technical Working Group to assist in revising the problem statement for release with the program request-for-proposals (RFPs), and in evaluating proposals received in response to the RFP. The Technical Working Group may also assist the manager in developing the scope-of-services for the project, providing technical input throughout the project's life, and assisting in implementing research results. Typically, this team is composed of representatives from Department offices that are clients for the proposed work.

The Contract Management Bureau should be involved from the beginning of this process. The Technical Working Group determines and evaluates technical aspects of the project and the incoming proposals. The Contract Management Bureau ensures that the contract selection process is representative, complete, reasonable, and clear, and provides quality review.

The Contract Development Process

After a project contractor has been selected as a result of the RFP process, the project manager's responsibility is to develop the project's scope-of-services in conjunction with the Transportation R&D Bureau, the Contract Management Bureau, and the principal investigator. Some factors to consider during development of the scope-of-services are listed in Table 2 (p. 60).

Contract Execution

When the contract has been signed, the project manager's main function is to monitor and evaluate contractor performance. The manager is expected to track project progress, approve or disapprove interim and final products of the study, approve release of funds related to completion of these activities, and scrutinize the project's overall fiscal status. Ancillary activities include filing periodic status reports to the contract research program, and maintaining communication between researchers and potential users to ensure that needs are addressed, sound

Table 3. Contract management activities.

	Persons/Offices Involved
1. Pre-Contract Activities	
• Form evaluation teams	Proj Mgr, TR&D, Contract Mgt Bureau
• Revise problem statement/develop scope-of-services	Proj Mgr, Evaluation Team, TR&D, Contract Mgt
• Develop evaluation criteria/criteria weights	Proj Mgr, Contract Mgt
• Evaluate proposals	Evaluation Team, Proj Mgr
• Make recommendations for selection of contractor	Evaluation Team
2. Contract Development Process	
• Develop detailed scope-of-services	Prin Investigator, Project Mgr, Evaluation Team, Contract Mgt, TR&D
• Develop project task schedule	Proj Mgr, Prin Investigator, Contract Mgt
• Develop payment schedule	Proj Mgr, Prin Investigator, Contract Mgt
3. Contract Execution	
• Approval of deliverables/milestones	Proj Mgr*
• Approval of payment	Proj Mgr, Expenditures Unit
• Consultations with client offices and contractor	Proj Mgr*
4. Contract Completion	
• Final project approval	Proj Mgr*
• Final payment/audit	Proj Mgr*, Expenditures Unit, Contract Audit
• Product implementation	Proj Mgr, Evaluation Team, Client Office, TR&D, Prin Investigator

*Project Manager, at his discretion, may request input from the evaluation team for these phases.

scientific methods are used, and findings are credible. These duties and the offices involved are summarized in Section 3 of Table 3.

Approval and Payment for Deliverables

Prompt-Payment Legislation Provisions

The project manager should be aware that provisions of the state's prompt-payment legislation are in effect for projects funded through the contract research program. Consequently, attention should be paid to the deliverable-and-payment schedule established at the project's inception. Key provisions are:

1. The required payment date for a contractor's request-for-payment is 30 calendar days after receipt of proper invoice (Form FIN 110d, shown on p. 64).

2. Late payments are subject to an interest penalty computed at the same rate set by the State Tax Commissioner for corporate taxes. The interest penalty is paid from the same appropriation as that from which the related invoice is paid.

3. The state has 15 days following receipt of an invoice in which to notify the contractor of any deficiencies in the submission. Accordingly, the 30-day payment period does not begin until deficiencies are corrected and the revised invoice is received. However, if the contractor was notified of deficiencies after the 15 days provided, the 30-day period is reduced by the number of additional days involved.

4. Interest provisions of the legislation apply to eligible payment invoices received on or after July 1, 1988.

Payment Instructions

The contractor will bill the Department in the person of the project manager on standard payment vouchers at completion of each deliverable or milestone. On receipt of the bill, the project manager will approve or disapprove payment based on deliverable quality, attach proof of completion of deliverable supplied by the principal investigator (Form FIN 421, on pp. 65-66), complete the project-status-report form (pp. 67-68) for the particular milestone, and forward the approved voucher for payment to:

Supervisor, Expenditure Unit
Accounting and Fiscal Services Bureau
New York State Department of Transportation
State Campus, Albany, New York, 12232-0749

A project manager in a regional office should submit the completed approvals and standard vouchers to the regional administrative officer for submission to the Expenditure Unit.

An informational copy of the deliverable and the approved or disapproved authorization voucher, along with the completed evaluation form, should be sent to:

Technology Transfer Section
Transportation Research and Development Bureau
New York State Department of Transportation
State Campus, Albany, New York 12232-0869

The manager should remind the principal investigator when a deliverable is due, and that it should be accompanied with a request-for-payment if payment is to be made within the statutory amount of time. If the deliverable is unsatisfactory, payment need not be made until the Department is satisfied with the quality of the product, and the prompt-payment rule does not take effect until acceptance of the product. (See "Contract Execution" on p. 61.)

The manager should be aware that under terms of the contract with the contractor, the state typically retains 10 percent from each milestone payment made to the contractor until the state's final acceptance of all work performed and deliverables that the contractor is required to provide.

Generally, the manager should be aware of the terms of the contract articles dealing with manner of performance of work, project personnel, period of performance, compensation, executory clause, milestone payments, retainage, final payment, extra work, termination, and order of precedence. These articles represent the contract sections that have been negotiated with the principal investigator and the investigating institution. When considered along with the scope-of-services and project schedule, they define the Department's duties and responsibilities and delineate what may be done and how and when it is to be done.

Evaluation Forms and Instructions

The project-status-report form developed by the TR&D Bureau for the contract-research program, and a standard voucher (Form FIN 110d) and a payment request (Form FIN 421) to be submitted to the Department when making a request-for-payment. The project-status-report form is intended to enable the project manager to make periodic evaluations of suitability of the research product at various stages of project development, and to provide necessary documentation for payment approval or disapproval (should that be necessary).

FIN 110d (3/84)
AC 92 (3/84)

STATE OF NEW YORK - STANDARD VOUCHER

Voucher No.

1 Originating Agency: DEPARTMENT OF TRANSPORTATION | Orig. Agency Code | Interest Eligible (Y,N) | 2 P-Contract

Payment Date (MM) (DD) (YY) | Check Date (MM) (DD) (YY) | Liability Date (MM) (DD) (YY)

3 Payee ID | Additional | Zip Code | Route | Payee Amount

4 Payee Name (Limit to 30 spaces) | 1099 Code | 5 Merch/Inv Rec'd Date

Payee Name (Limit to 30 spaces) | Statistic Type | Statistic

Address (Limit to 30 spaces) | 6 Ref/Inv No. (Limit to 20 spaces)

Address (Limit to 30 spaces) | Ref/Inv Date (MM) (DD) (YY)

City (Limit to 20 spaces) (Limit to 2 spaces) → | State | Zip Code

7 Purchase Order No. and Date	Description of Material/Service If items are too numerous to be incorporated into the block below, use form AC 93 and carry total forward.	Quantity	Unit	Price	Amount

8 Payee Certification:
I certify that the above bill is just, true and correct; that no part thereof has been paid except as stated and that the balance is actually due and owing, and that taxes from which the State is exempt are excluded.

➡ _____ Payee's Signature in Ink _____ Title

_____ Date _____ Name of Company

Total | Discount % | Net

FOR AGENCY USE ONLY

Merchandise Received | Date | Page No. | By

I certify that this voucher is correct and just, and payment is approved.

_____ Authorized Signature

_____ Date _____ Title

STATE COMPTROLLER'S PRE-AUDIT

Verified | Audited | Special Approval (as required)

Certified For Payment of Net Amount

By _____

EXPENDITURE / LIQUIDATION

Dept.	Cost Center	Var.	Yr.	Object	ACCUM Dept.	ACCUM Statewide	Amount	Orig. Agency	PO/Contract	Line	F/P
17											

Liability Date	From Date	TC	Subledger	DOT SO (1)	DOT Function (4)	DOT Reference Data (6)	DOT Project Identification No. (9)	CB Code (1)	SUFX (2)	(1)
(MM) (DD) (YY)	(MM) (DD)									

EXPENDITURE / LIQUIDATION

Dept.	Cost Center	Var.	Yr.	Object	ACCUM Dept.	ACCUM Statewide	Amount	Orig. Agency	PO/Contract	Line	F/P
17											

Liability Date	From Date	TC	Subledger	DOT SO (1)	DOT Function (4)	DOT Reference Data (6)	DOT Project Identification No. (9)	CB Code (1)	SUFX (2)	(1)
(MM) (DD) (YY)	(MM) (DD)									

DISTRIBUTION:
COPY 1 - O.S.C.
COPY 2 - Audit & Accounts (D.O.T.)
COPY 3 - Region (D.O.T.)

NYS DEPARTMENT OF TRANSPORTATION

FIN 421 (3/92) CONSULTANT'S PAYMENT REQUEST

PAYEE ID _____ NYS Contract No._____ Est. No._____
(FEDERAL ID)

Work Period(this est.) FROM__/__/__ TO __/__/_____

Payee Name

_____ Current Completion Date _____/__/__

_____

Street Address MIR Date __/___/____
(completed by NYSDOT
For approved M.A.P.)

_____

_____

City Original Contract Amount _____

_____

State _____ Current Contract Amount _____
(includes thru approved S.A. NO._____)

Zip_____ RRDA NO.(if applicable)_____

	CONSULTANT PREPARES	NYSDOT USE ONLY
1.Total work reported on previous estimates	_____	_____
2.Work reported on this estimate	_____	_____
3.Total work reported to date (must equal page 2)	_____	_____
4.Adjustments(NYSDOT use only) Reason_____		_____
5.Retainage thru current estimate	_____	_____
6.Total work reported less retainage	_____	_____
7.Previous payments	_____	_____
8.Payment requested or processed	_____	_____

CERTIFICATION BY CONSULTANT

I, _____ do hereby certify that I am the _____
(NAME) (TITLE)

OF _____ CONSULTANT FOR THE WORK REFERRED TO IN THE FOREGOING PAYMENT REQUEST THAT I AM THE PERSON IN WHOSE NAME THE FOREGOING ACCOUNT AGAINST THE STATE OF NEW YORK IS RENDERED; THAT THE LABOR, MATERIALS, EXPENSES OR SERVICES CHARGED FOR WERE ACTUALLY DELIVERED, INCURRED OR RENDERED, AS NAMED HERETOFORE, AND THAT THE PRICES CHARGED ARE JUST AND REASONABLE; THAT THE EXPENSES DETAILED HEREIN WERE ACTUALLY INCURRED; THAT THE SERVICES SPECIFIED WERE ACTUALLY RENDERED AS CHARGED; AND FURTHER, THAT NO PERCENTAGE OR COMPENSATION HAS BEEN PAID OR PROMISED TO BE PAID TO ANY MANAGER, TRUSTEE, OFFICER OR EMPLOYEE OF SAID INSTITUTION, DEPARTMENT, BOARD OR COMMISSION, BY REASON OF THE CLAIMANT HAVING BEEN ALLOWED TO SELL TO, INCUR EXPENSE FOR, OR RENDER SERVICES TO, SAID INSTITUTION; AND ALSO, THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF, NO MANAGER, TRUSTEE, OFFICER OR EMPLOYEE OF SAID INSTITUTION, DEPARTMENT, BOARD OR COMMISSION HAS OR HAS HAD, ANY INTEREST DIRECTLY OR INDIRECTLY IN SAID ARTICLES, MATERIALS, EXPENSES OR SERVICES; AND THAT NO PART OF THE FOREGOING ACCOUNT HAS BEEN PAID, AND THAT THE ABOVE STATEMENT IS TRUE AND CORRECT .

_____ _____
(DATE) (SIGNATURE)

CERTIFICATION BY DEPARTMENT

REVIEWED BY NYC_____

I, _____, DO HEREBY CERTIFY THAT I AM THE _____
(NAME) (TITLE)

EMPLOYED IN THE SUPERVISION OF THE WORK DESCRIBED IN THE ATTACHED CONSULTANT'S PAYMENT REQUEST; THAT THE MATERIALS, LABOR AND SERVICES HAVE BEEN FURNISHED AND THE WORK PROPERLY PERFORMED IN ACCORDANCE WITH THE CONTRACT, AND THAT PAYMENT IN THE SUM OF

$_____ CAN BE MADE ON THIS CONTRACT WITHOUT DETRIMENT TO THE INTERESTS OF THE STATE, TO THE BEST OF MY KNOWLEDGE AND BELIEF.

_____ _____
(DATE) (SIGNATURE)

FIN 421 (3/92) REVERSE

CONSULTANT'S PAYMENT REQUEST

NYSDOT CONTRACT NO.____________ ESTIMATE NO. ____________

IMPORTANT: The amounts reported below for each PIN must be supported by a CONSULTANT'S PAYMENT REQUEST CONTINUATION, FORM FIN 422. A SEPARATE FORM FIN 422 must be completed for each nine digit pin.

FAILURE TO REPORT ALL COSTS PROPERLY BY 9 DIGIT PIN MAY RESULT IN THE REJECTION OF THIS ESTIMATE.

PIN(MUST BE 9 DIGITS)	WORK PERFORMED			MAXIMUM ALLOC.THRU SA_____	FUNDS REMAINING OVER/UNDER
	CURRENT	PRIOR	TO DATE		
TOTAL					
LESS: RETAINAGE					
TOTAL NET OF RETAINAGE					

PROJECT STATUS REPORT
Contract Research Program
New York State Department of Transportation

P.I.N. _____ CONTRACT NO._____

TITLE: _____

_____

PRINCIPAL INVESTIGATOR: _____ DEPARTMENT MANAGER: _____

INSTITUTIONAL AFFILIATION: _____ OFFICE: _____

_____ _____

PROJECT DURATION: _____ START DATE: _____ EXPECTED COMPLETION DATE: _____

COST: $ _____ COMPTROLLER APPROVAL DATE: _____ REVISED START DATE: _____

CONTRACT AWARD DATE: _____ SCOPE OF SERVICE DATE COMPLETED: _____ NO. OF DELIVERABLES: ___

PROJECT SCHEDULE (% COMPLETED TO DATE: _____)

DELIVERABLE NO.	TYPE OF DELIVERABLE	DATE DUE	DATE DELIVERED	AMOUNT DUE
_____	_____	_____	_____	$ _____

OVERALL PROJECT PERFORMANCE ASSESSMENT TO DATE

Discuss Contractor's performance since last evaluation in meeting milestone deadline dates, and any difficulties or problems encountered. Make recommendations for improvement, if necessary.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

PERFORMANCE RATING FOR DELIVERABLE NO. _____

Use only factual statements in this section to justify your rating. All evaluations, both positive and negative, should be explained. Positive ratings are supported by the work product. Unsatisfactory evaluations, negative statements, and anomalies must be supported by documentation, (i.e., letters to the principal investigator, memoranda, copies of submittals, etc).

EVALUATION CRITERIA	GOOD	SATISFACTORY	UNSATISFACTORY	COMMENTS
Timely Performance of Work				
Technical Competence and Quality of Product				
Contractor's Professionalism				
Project Cost Management				
Flexibility				
Communicadon				

GENERAL COMMENTS AND RECOMMENDATIONS

_____

_____

_____

_____

_____

'ayment Approval: Y_ N_

Prepared by: _____

Date: _____

Table 4. Project performance standards and definitions.

Evaluation Criteria	Performance Standards Good	Satisfactory	Unsatisfactory
Timely performance of work	Tasks completed ahead of schedule, no significant revisions necessary, minimal oversight needed, high-quality deliverable produced	Tasks completed on time, some reminders necessary, revisions needed, good-quality deliverable	Late, incomplete, in need of major revision, deliverable of little value
Technical competence and quality of product	Completely versed in all technical aspects of project, handles complex problems well, reliable, good-quality product	Reliable, needs some technical supervision, functions acceptably with reasonable-quality output	Cannot function professionally, unreliable, poor-quality product
Contractor's professionalism	Ethical, creative, practical, and flexible at all times	Ethical, dependable, practical; needs some supervision and guidance	Unreliable, unable to produce quality work
Project cost management	Follows task assignments and schedules precisely; good correlation of costs, progress and deliverable quality	Progress, cost, deliverable quality are reasonable; task assignments not always on schedule or at professional level	Cannot relate costs and progress, ignores task assignments and schedule, poor-quality deliverable
Flexibility	Anticipates changing conditions or circumstances based on prior research results	Reacts quickly to changing conditions with little or no prompting	Does not react to changing conditions, continues unmodified program
Communication	Written/verbal communications are accurate, unambiguous, clarify issues, demonstrate accurate understanding of NYSDOT needs and objectives	Written/verbal communications generally accurate, demonstrate understanding of NYSDOT objectives; some prompting necessary to clarify and resolve issues	Written/verbal communications are infrequent, inaccurate, unresponsive to requests for information or clarification, demonstrates little understanding of issues or NYSDOT objectives

Overall Project Evaluation

The first section of the project-status-report form is an overall-performance assessment to date of the principal investigator's quality of work and general level of competence and professionalism on the project. Problems encountered in development of the project may be discussed in this section. Recommendations for improvement, if necessary, may also be made there.

Deliverable Evaluation

The second section of the project-status-report form is used in assessing usefulness to the Department of the specific deliverable, and performance of the principal investigator in producing the deliverable and meeting contract deadlines. The report should be completed whenever a major milestone or deliverable is reached. The objective is to guide contractor performance and provide feedback. Regular communication between the Department's project manager and the contractor is strongly encouraged. Performance standards and definitions are listed in Table 4.

The "General Comments" section of the project-status-report form should contain only factual statements. All evaluations, both positive and negative, should be explained. Positive ratings are supported by the work product. An unsatisfactory evaluation, negative statements, or anomalies in work quality or timeliness should be supported by documentation (i.e., letters to the principal investigator, memoranda, or copies of submittals). Note that in the contract agreement signed by the contractor the Department reserves to itself the right to terminate the contract if the principal investigator's performance is unsatisfactory. For these reasons it is important that comments reflect and agree with ratings given to the contractor. Verify that comments and ratings are consistent with one another. It is hoped that this periodic evaluation system will ensure that the Department achieves its desired objectives in the most cost-effective and efficient manner.

APPENDIX G
DATA MANAGEMENT PROCEDURES DURING AND AFTER CONCLUDING A RESEARCH PROJECT

The Transportation Research and Development Bureau routinely collects data, often in large quantities, from continuous monitoring of instrumented highway structures and pavements, and from field and laboratory testing. Purposes include checking validity of existing analytical procedures, verifying structural integrity, and refining new design procedures. The amount and type of data are project-dependent, and are collected and processed at the discretion of the principal investigator. Occasionally, data may have to be revisited for further analysis using more sophisticated tools, or for study of aspects of the problem not previously anticipated. After project completion and publication of a final report, the principal investigator thus should prepare the raw and processed data for archive storage before closing the project, using the guidelines provided here. These guidelines are based on the following assumptions, and the investigator archiving the data should note them carefully:

1. Data being stored are correct and validated.
2. Sufficient explanation of the data is included, so a person retrieving data can use them.
3. Appropriate analyses were used.
4. All input data provided for the suggested analyses are valid.
5. File integrity is tested before archiving.
6. All invalid data files and files used for intermediate stages of analysis are removed.
7. All data abnormalities are recorded.

The following guidelines are suggested for the principal investigator:

1. Test the raw data randomly (at least 10 percent of the files) to ensure that only valid and appropriate data are stored. Remove all inaccurate or invalid data. If any links or files are missing, document and explain the details. If part of the raw test data collected cannot be removed from the files, give sufficient explanation. Note that the person retrieving data may have no knowledge of the archived information.
2. After converting the files to the format provided here, check at least 5 percent of the files to ensure that data integrity is maintained. Make sure processed files represent the same information.
3. State data limitations or other observations that may be helpful to future users.
4. Give documentation so that future users can check data integrity.
5. Plan for archiving from the start of the project. Use an archival format created so that data can be organized as the project progresses.

6. Ask other researchers not involved in the project to examine the data when ready for archiving, and also to check for retrieval.

7. Randomly retrieve at least 5 percent of the data from the archival files, convert them to native format, and make sure that they can be retrieved without loss of substance and meaning.

At the conclusion of a study, compile one main directory to be retrieved using the first six digits of the PIN number and year of completion. (For example, Project R20801881 completed in 1995 should be identified as R2080195.) To retrieve this directory once project records have been archived, a user should contact the Bureau's system administrator to access the data. It will be retrieved and the entire project directory placed on the network for easy access. The main directory should contain a "readme.txt" file and four subdirectories titled "preproj," "reports," "data," and "software."

1. "readme.txt" File

This stores essential features of the project and briefly describes the contents of the subdirectories. Anyone retrieving data should read this file before entering the subdirectories, because information stored here gives a synopsis of the contents archived. ASCII format (78-column width) should be used in creating this file. (Files created using most commercial softwares can be easily converted into ASCII format using the tools provided in those softwares. Currently, files in ASCII format can be viewed by any browser or converted to native formats using available softwares.) This file should contain the following information:

Project Title
Project Number
ERTAP Number
Year Initiated
Year Completed
Project Cost
Principal Investigator
Other Investigators
Clients
Reports Published (with full titles, authors, dates)
Abstract (maximum 250 words)
Key Words (maximum 10 terms)
Followup Projects (if any)
Titles of Subdirectories (with brief summaries of their contents)
Software Used (list all software used in creating files in this directory, with version numbers, manufacturer's names, and other relevant details associated with the software)

2. "PreProj" Subdirectory

This contains information collected before the study was assigned a PIN number:

a. A "readme1.txt" file in ASCII format (78-column width) including a table with file names in this subdirectory, software used in their preparation, a brief description of contents of each file (see Table 5 for format). Future users should read this file before entering other files.

b. Files in this subdirectory should include 1) research suggestion information including persons involved, suggestion number, and reviewer's name, 2) proposed research review form (PHR-111), and 3) project study proposal.

Table 5. Table Format for Readme.txt Files

File Name in Native Format	File Name in Archival Format	Contents	Additional Remarks (if any)

Table 6. Raw File Format and Corresponding Archival Format

File Type (raw/native)	File Type (archive)
Word-Processing (.wpd, etc.)	ASCII
Spread-Sheets (.wb1, .cal, etc.)	.DBF or ASCII comma delimited or none
Database	.DBF
Graphics	.BMP or .TIF
Special Files (using customized software)	Consult System Administrator

Note: Any questions regarding conversion of files from native to archive format, and special files, should be directed to the Bureau's System Administrator.

3. "Reports" Subdirectory

This contains details of reports published during the study.

a. A "readme2.txt" file in ASCII format (78-column width), including 1) table of file names in this sub-directory (see Table 5), 2) details of the software used to create them, and 3) a brief description of their contents. Again, a person retrieving these data should read this before looking into other files. This file should list reports published with their full titles, authors, and dates.

b. Report files in native and archived formats (see Table 6).

4. "Data" Subdirectory

This contains relevant project data in native and archival formats (see Table 6):

a. A "readme3.txt" file in ASCII format (78-column width): containing 1) a table with file names included in this subdirectory, 2) details of the software used to create them, and 3) a brief description of contents. A future user should read this before entering other files.

b. Two subdirectories titled "raw" (all data files and processed files in native format) and "archive" (files corresponding to those in the "raw" subdirectory but in archival format). See Table 6.

5. "Software" Subdirectory (this file will be empty if no special software were used)

This contains and describes any customized or special software prepared for the study. It includes 1) a "readme4.txt" file in ASCII format (78-column width), containing details of all customized or special software used, and any relevant information for processing in conjunction with other files stored in other subdirectories using the same software, and 2) the software files.

APPENDIX H
ETHICS, CONFLICT OF INTEREST, AND SAFETY TRAINING POLICIES

For greater detail regarding matters of ethics, conflict of interest, and numerous other subjects concerning conduct on the job, all employees are referred to the current edition of the Department's *Employee Handbook.*

Code of Ethics/Conflict of Interest

The Ethics in Government Act establishes standards of conduct requiring state officers and employees to maintain the highest principles of conduct in performing their jobs. This creates an employed obligation to conduct him/herself in a way reflecting favorably on the state agency, the public, and the employee. The Act also requires annual financial disclosure on the part of policymakers and other high officials in public service.

Section 73 of the Public Officers Law provides guidelines for employees engaged in business or professional activities outside their state service, and instructions for financial disclosure. Section 74 of the Public Officers Law is the Code of Ethics. The Department also has established policies related to these sections. A conflict of interest is a situation is which an employee allows his/her interests and activities outside the workplace:

- To influence the conduct of official duties, including conduct of contract research or submission of research projects, or
- To impair performance or independence of judgments in exercise of official duties, or
- To use one's position directly or indirectly for personal or family gain.

The employee should review the Standards and Code of Ethics in Sections 73 and 74 of the Public Officers Law. A pamphlet explaining these sections is given to each employee at time of appointment to state service. Extra copies are available from the DOT personnel office. After reviewing these guidelines, employees should:

- Complete Form PER 79a ("Notice of Extra Employment or Activity"), if necessary.
- Meet with his/her supervisor to discuss individual situations when appropriate.

Each situation is reviewed individually to ensure that neither the employee nor Department will be placed in a situation where there is either conflict of interest or appearance of a conflict. The pamphlet also contains regulations promulgated by the Ethics Commission governing limitations on receipt of honoraria, reimbursement of expenses by outside agencies, and outside activities. Employees should be familiar with the content of these regulations and observe them.

DOT/Bureau Safety Policies

For good reasons, the Department has made major priorities of employee safety and health, resulting in significant reduction of injuries and vehicular accidents. Program elements have emphasized a positive approach in addressing operational problems contributing to an unsafe work environment. Improvements in equipment and procedures, development of safety policies and program safety manuals, increased emphasis on training, safety awards programs, and other efforts have played important parts in the progress attained.

The Department cannot tolerate continued violation of established safety policies. The disciplinary process should be considered for employees refusing to work safely and having been counseled for such violations. Managers and supervisors at all levels should use the disciplinary process when reasonable efforts have failed to correct unsafe behavior. When an individual violation is of such severity, discipline is appropriate as the initial response. Violation of safety rules should not be viewed differently than other serious acts of insubordination or misconduct for which discipline is the appropriate recourse.

Safety awareness in the office is of as much concern as in the field. Office personnel are made aware of safety rules through regularly distributed bulletins, which are then posted on safety bulletin boards by Bureau safety officers. The safety officer has his/her own manual containing all compliance plans and safety bulletins. He/she Informs all new employees of pertinent rules and regulations, and continuously informs all employees of new rules or changes to rules affecting those persons.

Field Personnel/Tailgate Safety Training

"Tailgate" safety training sessions provide informal training periodically or as needed at the work-crew level. Tailgate sessions should be considered when one or more of the following situations exist:

1. A particular task has not been performed in six months.
2. A new employee joins a work group.
3. A specific task or location requires special equipment or procedures; for example,
   - Exposure to risk of falling (e.g., working on rock slopes, pile testing, bridge instrumentation)
   - Work on water (e.g., subsurface exploration from a floating platform or bridge over water)
   - Working on a highway section with limited sight distance.
   - Changing from one-way to two-way traffic.
   - Working around manufacturing plant machinery, construction equipment, or similar areas).
4. A recent accident is reviewed to benefit from lessons learned.
5. After a near-miss, when a non-injury accident occurs that might have resulted in personal injury.
6. To increase alertness and re-emphasize potential hazards when an operation has been repeated many times and employees have settled into a routine.

7. New equipment is placed in service.

Immediate supervisors (or field supervisors, when appropriate) are responsible for scheduling these sessions, under overall guidance of the safety officer. Formal documentation is not required, but supervisors should report the session and topic in his/her periodic work summary. Tailgate sessions should be scheduled at the start of a task to emphasize safety measures necessary during its performance. They should have specific purposes or topics, and be scheduled at appropriate times (close to the performance of the task).

Toxic Substances

In compliance with requirements of the Federal OSHA Hazard Communication Standard (1910, Subpart Z), the New York State Right-to-Know Law (Article 28), and New York State Department of Labor Regulations (12 NYCRR, Part 820), the Bureau has implemented a safety-compliance plan for employees routinely exposed to toxic substances and for all field crews, with the following provisions:

1. New employees are given an indoctrination program by their supervisors, including names of chemicals they will be handling, their possible health hazards, and prescribed safety requirements when handling them.

2. All employees routinely exposed to toxic substances are given annual training, with detailed provisions governing its content and records kept of training schedules.

3. Material safety data sheets are available to employees for each toxic substance used by the Bureau.

4. Records are kept of all employees handling or using substances listed in OSHA Regulations (1910, Subpart Z).

5. All toxic-substance containers are kept safe and properly labeled.

6. A current inventory of toxic substances is maintained, and hazardous wastes are disposed of in the prescribed manner.

7. Right-to-know signs are posed at all work stations.

8. The compliance plan is posted on the safety bulletin board, and copies are available.

Also, a continuing effort is make to ensure safety of field crews. Safety supplies and equipment are kept on hand to be signed out, as needed, and tailgate safety sessions are conducted by field supervisors when needed.

Overall Department Safety Policy

The Department has adopted numerous standard safety procedures and requirements -- for example, use of hard hats and high-visibility apparel when working in the highway right-of-way. Bureau employees must comply with these standards. It is impossible to adopt standards applying to every situation that may arise, but the Construction Division's Safety and Health Handbook is a comprehensive compendium of existing Department standards, covering most situations encountered by Bureau personnel in performing their duties. The handbook is available from the Bureau's safety officer. Personnel may find themselves in situations where safety standards promulgated by others may apply, as when working in a laboratory. It is their responsibility to determine if specific standards apply, and comply with them. Except for footwear, the Bureau maintains a full inventory of safety equipment, including eye

protection, fall protection, gloves, and ear protection. All this is available from the Safety Officer or stockroom attendant. All employees must comply with existing policy, report unsafe situations, and always use good judgment and common sense.

APPENDIX I
PROGRESS REPORTS/PROJECT STATUS REPORTS

The TR&D Bureau uses Project Status Reports to monitor and control approved projects. The reporting format shown in Figure 10 is used for all approved projects regardless of funding source, listing the following information:

Date Report Was Produced

Thru Pay Period: last period for which personal service costs are reported (other costs may be more current than that pay period).

Figure 10. Typical project status report.

06/12/1997 NEW YORK STATE ENGINEERING RESEARCH AND DEVELOPMENT BUREAU
THRU PAY PERIOD S26/F13 PROJECT STATUS REPORT
IAS RUN DATE IS 04/02/1997 FHWA SEMI-ANNUAL

PROJECT: R22401881 TITLE : DEV OF OVERLAY DESIGN PROCE FOR NYS
SECTION: MATER./PAVING INVESTIGATOR: DR. BENDAÑA
CLIENT :
CONTRACTOR :

PROJECT INITIATION DATE : 12/02/1993
STUDY PROPOSAL DUE : 05/31/1994
STUDY PROPOSAL COMPLETED: 07/06/1994
STUDY PROPOSAL APPROVED : 11/08/1994
ORIGINAL COMPLETION DATE: 09/30/1996
REVISED COMPLETION DATE : 09/30/1999
REVISION NUMBER : 1

APPROVED STUDY PROPOSAL AMOUNT : 5000
ACTUAL STUDY PROPOSAL AMOUNT : 0
APPROVED ORIGINAL BUDGET AMOUNT: 106000

	ACTUAL EXPENDITURES		PROGRAMMED EXPENDITURES			
	YTD	LTD	YEAR TOTAL	LIFE TOTAL	YTD SCALED	LTD SCALED
PERSONAL SERVICE	28187	163714	80000	300000	40000	164000
TOTAL COSTS	28187	163714	80000	300000	40000	164000

OBJECTIVE: To develop an overlay design procedure suitable for NYS and acceptable to FHWA.

PROGRESS: Currently, we are working with Planning on a procedure to calculate design traffic as a function of highway classification and month of the year. The design traffic is calculated monthly to account for seasonal traffic distribution to model the combined effects of traffic, soil support condition, and temperature distribuiton on pavement stresses, pavement performance. Ultimately, this model will be used to predict.

SIX-MONTH PLAN: Continue the study according to the work plan.

IAS (Internal Accounting System) Run Date: end of pay period through which expenditures are reported.

Project: authorized project identification number (PIN).

Section: organization code for the section assigned primary responsibility for the work.

Title: truncated version of the project title.

Investigator: name of the principal investigator assigned to the project.

Client: organization group for whom the research is performed.

Contractor: outside research organization assigned to conduct the research effort.

Project Initiation Date: date of Department approval of development of a study proposal/work plan.

Study Proposal Due: six months after the project initiation date.

Study Proposal Completed: date submitted to the Department for approval.

Study Proposal Approved: date approved by the Department.

Original Completion Date: date stated in study proposal for project completion.

Revised Completion Date: date agreed upon by client and Department.

Revision Number: total times that project completion data has been changed.

Approved Study Proposal Amount: sum requested at project initiation for completion of the proposal.

Actual Study Proposal Amount: sum actually required to complete proposal, taken from the IAS report for pay period when proposal was approved.

Approved Original Budget Amount: sum budgeted for project in approved proposal.

Actual Expenditures, YTD (year-to-date and LTD (life-to-date): those reported by IAS as of pay period identified in this report.

Programmed Expenditures:

Year Total and Life Total: budgeted expenditures identified in current approved budget.

YTD Scaled and LTD Scaled: corresponding expenditures scaled by the pay period being reported.

Objective: brief description of the project and its purpose.

Progress: highlights of project accomplishments over the previous six months.

Six-Month Plan: expected accomplishments in following six months.

APPENDIX J
THE PROJECT-LEVEL PEER-REVIEW PROCESS

Research-project peer review is independent evaluation of research concepts, ideas, techniques, and/or procedures for implementation, to assure a high degree of research quality and to avoid duplication of research effort. Peer review is not necessary for all projects. The following selection criteria may be used as a guide in deciding which projects need peer review, before funds are allotted in a project budget for peer review.

Project Selection

Peer review is based on project cost, duration, type, and/or critical result. The following guidelines are suggested for establishing peer review as part of the research project:

1. If project budget exceeds $100,000.
2. If expected duration is greater than two years.
3. If the project needs peer review for final FHWA approval.
4. If results are critical (i.e., when the project is expected to have a large or radical impact on design and/or construction procedures, or implementation has safety implications).

If the project under consideration meets one or more of these requirements, its study proposal should build peer review into the research process.

Review Process

Review is conducted at several stages by one or more reviewers:

1. Within one month after the study proposal is drafted.
2. When the work is about half completed, but no later than when two-thirds of the funds have been expended.
3. After the draft final report is completed.

Note that for projects not initially meeting these criteria, but expanding in scope or becoming critical, peer review is recommended at Stages 2 and/or 3 (at the discretion of the investigator and Bureau Director). When peer review is anticipated, allocate 2.5 percent of total project cost (not exceeding $5000 per reviewer) in the project budget as a lump-sum amount.

Reviewer Selection

Reviewers can be selected based on an established list or from qualified persons in the subject field (as seen from the literature review, etc.). Minimum qualifications might include:

1. Tenured professor in an accredited university.

2. Chair of a technical committee or subcommittee in such an association or organization as AASHTO, TRB, ASCE, ASNT, OR ASTM.

3. Research engineer in a national research organization such as CERF, Army Corps of Engineers, Applied Research Institute, National Science Foundation, or research agencies of state transportation departments, with more than 10 years experience in the speciality area of the project under consideration.

Note that for projects including field experiments, some reviewer should have a current professional engineering license and a minimum of 5 years experience as a practicing professional. In addition to these general requirements, in special cases principal investigators (in consultation with the Bureau Director) may want review by an expert in the project subject area, as evidenced by his/her publications with national and/or international circulation.

Guidelines for Reviewers

Reviewers are entitled to compensation for participating in the review process. A contract can be reached with the peer reviewers, once selected, including acceptable time-frames for review and payment schedules.

Special Items

1. If a reviewer is unable to meet review deadlines, or discontinues a review for whatever reason, another reviewer should be found as quickly as possible to avoid project delays. If reviewers fail to meet deadlines, other reviewers should be given priority consideration for future reviews.

2. If reviewer comments conflict, this may be resolved by submitting project documents to another reviewer acting as a tie-breaker.

Note that peer reviewers are meant to enhance project quality, not to serve as watchdogs for research. Their comments should aid the investigator in conducting the work more efficiently. Reviewer recommendations are not binding and need not be followed by the Department.

APPENDIX K. BOOKSHELF AND NCHRP IMPLEMENTATION PRACTICES CHECKLIST

Beach, D.P., and Alvager, T.K.E. Handbook for Scientific and Technical Research. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1992.

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Chatfield, C(hristopher). Problem Solving: A Statistician's Guide. London: Chapman & Hall, 1993.

Facilitating and Expediting Technology Transfer. Publication FHWA-HI-94-041, National Highway Institute Course 42015, Federal Highway Administration, U.S. Department of Transportation, 1994.

Griffin, L.I., III, Engineers' Guide to Program and Product Evaluation. Report FHWA-SA-93-028, Federal Highway Administration, U.S. Department of Transportation, 1990.

Hogg. R.V., and Ledolter, J. Applied Statistics for Engineering and Physical Scientists. New York: Macmillan Publishing Company, 1992

Manning, D.G., and Bacchus, A.R. Manual for Scientific Inquiry into Transportation Problems: Research Methodologies. Draft Report on NCHRP Project HR 20-7(74), by D.G. Manning and Associates, St. Catherines, Ontario, Jun 1996.

Reilly, E.F. Managing Contract Research Programs. Synthesis of Highway Practice 231, National Cooperative Highway Research Program, Transportation Research Board, 1996.

Research Advisory Committee Handbook: A Guide for Committee Members. Research Advisory Committee of the Standing Committee on Research, American Association of State Highway and Transportation Officials, June 1996.

Research Program Management for State Highway Officials: Participant Notebook. Publication FHWA-HI-91-001, National Highway Institute Course 33043, Federal Highway Administration, U.S. Department of Transportation, May 1991.

The Scientific Approach to Research. Transportation Research Circular 426, Transportation Research Board, May 1994.

Williams, D. Performance Evaluation Mechanisms for Transportation Research Programs. Synthesis of Practice 4, Transportation Association of Canada, May 1996.

IMPLEMENTATION PRACTICES CHECKLIST

NCHRP Project 20-33(1), Facilitating the Implementation of Research Findings

Project Title: _____

Project Technical Representative: _____

Date: _____

Type of Planning Performed (check one):

- ☐ Preliminary Implementation
- ☐ Final Implementation

IMPLEMENTATION PRACTICES (Listed in Order of Importance)

1. Pilot, demonstration or other field test done in real user/applications setting.
   - ✓ What pilot, demo, or field test would be most productive to further the implementation process?
   - ✓ Has an opportunity for such a real user test been incorporated into the project?
   - ✓ Have the prospective users been involved in planning this pilot?
   - ✓ How will this activity be incorporated into the overall implementation plan?
   - ✓ _____

   Action: _____

   _____

   By Date: _____ By Whom: _____

2. Innovation matches the users' needs.
   - ✓ Is the research result solving a genuine need?
   - ✓ Is there ongoing assessment that the project is continuing to match users's needs?
   - ✓ Does the potential user understand this research result will solve the identified problem?
   - ✓ Have criteria of success been identified so that there is a means of understanding that the problem was solved?
   - ✓ How will this activity be incorporated into the overall implementation plan?
   - ✓ _____

   Action: _____

   _____

   By Date: _____ By Whom: _____

3. Strong commitment from senior management to implement this product or process.
   - ✓ To what strategic objective of the organization does this research result contribute?
   - ✓ How will the results of this research be communicated to the senior managers so that interest is maintained and increased for implementation activities?
   - ✓ Who are the senior managers that have given their commitment to this project?
   - ✓ If no such commitment has been shown, what must be done to get the appropriate senior managers personally to commit to this project?
   - ✓ How can the senior managers' influence best be used to further the implementation of the research results produced by this project?
   - ✓ How will this activity be incorporated into the overall implementation plan?

✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

4. Adequate funding to implement the product or process.
   - ✓ How much will it cost to implement the product or process and to what extent of institutionalization will the implementation funds be used?
   - ✓ What is the source and amount of funding for implementation? Are users' funds contributing to the implementation efforts?
   - ✓ When will the funding be available and are there any special requirements to be fulfilled to release these funds?
   - ✓ Are the funds able to be used for all aspects of the implementation? (e.g. travel, equipment, materials)
   - ✓ How will this activity be incorporated into the overall implementation plan?
   - ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

5. Collaboration among the users of the implemented product or process, the researchers, and suppliers/contractors.
   - ✓ Have all the "players" been identified and representatives of the various groups been asked to participate in some substantive manner?
   - ✓ What provisions have been made to foster collaboration among researchers, users, and others involved in the implementation?
   - ✓ What are the most probable impediments to collaboration and how can they be overcome early in the research effort?
   - ✓ How will this activity be incorporated into the overall implementation plan?
   - ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

6. User participation in vital stages of the research and development.
   - ✓ What are the vital points in the course of the R&D where users could most contribute to bettering the research result?
   - ✓ How early in the project should researchers and users collaborate?
   - ✓ What structure exists to incorporate users? e.g. cross-functional team associated with the project?
   - ✓ Are the selected participating users those that can positively influence early implementation efforts?
   - ✓ Are the users selected representative of the universe of potential users?
   - ✓ What mechanisms are in place to educate the researchers regarding the users' needs and the eventual implementation environment?
   - ✓ How will this activity be incorporated into the overall implementation plan?
   - ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

7. Is there a champion(s) for the research and research results on site where the products or processes are to be implemented?
   - ✓ Who is the champion, how much influence does the champion have and on what agency levels?
   - ✓ Is the champion one who is technically respected by peers and management, having high credibility?
   - ✓ In a case where an important champion may not be an agency employee, what provisions are being made to have that champion on site?
   - ✓ To what degree will the champion participate in the formal project activities and particularly in the implementation?
   - ✓ Is more than one champion needed, each directed to specific management levels or other groups involved in the project?
   - ✓ How will this activity be incorporated into the overall implementation plan?
   - ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

8. Is there a high level of relevant technical skills in the organization that will be using the results of the research? (Considering the more the users know about the technical aspects of the new product or process being implemented, the easier is the implementation...)
   - ✓ What level of technical expertise do users have?
   - ✓ Is this a sufficient level for users to truly understand the advantages of the new product or process?
   - ✓ Will users be able to use the new product or process from the start? or by when?
   - ✓ How will this activity be incorporated into the overall implementation plan?
   - ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

9. Implementation package available and appropriate continuing implementation and technical support for users.
   - ✓ What are the appropriate tools and materials to include in a package that will assist the users in adopting the new products or processes?
   - ✓ What do the users say is most helpful to include in such a package?
   - ✓ Is more than one such implementation package required -- each addressing different user groups? (e.g. department users and contractors)
   - ✓ What kind of administrative or technical support will be made available to users, and for what period of time?
   - ✓ How will this activity be incorporated into the overall implementation plan?
   - ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

10. Demonstrable advantages of the innovation.
    - ✓ Have demonstrable advantages of the new product or process been identified clearly and early, perhaps through a pilot or demonstration, or initial implementation efforts?
    - ✓ Have these advantages been communicated to the appropriate stakeholder groups, users, senior

management, contractors, suppliers, or others? Have these communications efforts been tailored to fit each group?

✓ What opportunities have been identified to physically/in real-time show off these advantages to the various stakeholders?

✓ How will this activity be incorporated into the overall implementation plan?

✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

11. Clear goals for the implementation effort.

✓ Have clear, concise, achievable implementation goals been written?

✓ Have such goals been identified for the various stakeholder groups and then communicated to them in the most meaningful way so they will foster implementation?

✓ Were the stakeholders involved in defining the implementation goals?

✓ Do all participants understand their roles in achieving the goals?

✓ How will you know you have achieved the goals? (Are criteria of success established? See #2)

✓ How will this activity be incorporated into the overall implementation plan?

✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

12. Targeted funding for the implementation activities.

✓ Not only is there sufficient funding for implementation (#4), is it targeted to implementation for this project?

✓ What are the most productive uses for this targeted funding?

✓ Are there any responsibilities

✓ How will this activity be incorporated into the overall implementation plan?

✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

IMPLEMENTATION SUMMARY

Prioritized Action Items:

✓ Determine what actions will bring the largest payback for implementation efforts within the given resources and capabilities.

Follow-up Review Date(s):

01586
LRI